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Tapioca, *Tap' i o' ka*. A starchy food prepared from the root stalks of the cassava or manioc, a native of South America, and the West Indies, but is cultivated successfully in Florida and other Southern States. The root stalks are washed, then grated, then stirred into tanks of water. The starch settles in irregular globular masses forming the tapioca of commerce.

Tapir, *Ta' pir*. An odd-toed animal of the Tapir family but closely related to the horse. It is a gentle forest animal, feeding by night near the water courses of South and Central America, and of the Malay Peninsula. Its body is stout and powerful, its legs short and its nose prolonged into a flexible proboscis, by which it draws tender shoots and herbs into its mouth. The hair is short and upon the neck forms a stiff, short mane. In color, the tapir is generally gray-brown, but species are found which have white backs, or a white spot behind the ears. There are four short, spreading toes upon the forefeet, three upon the hind feet.

Tar, a dark, thick and sticky liquid obtained by destructive distillation of various substances, chiefly wood and bituminous coal. The term without qualification means wood tar. The tar produced in the United States is made from the long-leaved pine found in the Southern States. The process is crude and wasteful. An excavation is made in a steep bank or hillside, and an iron pan having a spout for an outlet is placed in the bottom. The pit is then filled with green pine wood, cut into pieces three or four feet long and a few inches in diameter. The entire tree, even including the roots, is used. When the wood is in place, the front of the pit is covered with turf and earth to exclude the air. A small opening is made at the top and another at the bottom to provide a draft. The fire is lighted at the bottom and burns slowly without flame. The tar is roasted from the wood and drips into the pan, from which it flows through the pipe into a barrel. Tar is used for tarring ropes,

calking seams in boats and sidewalks, making tar roofs and for various other purposes. See TURPENTINE; COAL TAR; ANILINE.

Taran'tula, a name applied to several species of spiders whose bite is supposed to be poisonous. The species of this name in southern Europe is a large-bodied spider having its abdomen and appendages thickly covered with stiff, brown or black hairs. Its bite, which, under some conditions, is said to be fatal, was once given as the cause of the dancing mania, tarantism, which, in turn, has given rise to the rapid, lively music called the tarantella. There is a well-grounded belief that the only cure for a tarantula bite is the inducing of excessive perspiration, and to do this, the person bitten was made to dance rapidly. The disease and the cure have become so confused in people's minds that the dancing is generally spoken of as one of the symptoms rather than as the cure. The tarantula is frequently received in the United States in fruit shipped from the Mediterranean region, but the reports concerning its ferocity and the effects of its bite are so varied that it is probable that the spider is not so dangerous as was once supposed.

The tarantula of southwestern United States is a member of an allied genus and is even more feared in the United States. It is a large, dark-colored spider with hairy appendages. It digs a burrow, in which it spends the greater part of the day, but from which it issues to prey upon night-flying insects. If disturbed, this tarantula is apt to be ferocious; that its bite is necessarily fatal, however, has not been absolutely proven. Consult J. H. Fabre, *The Life of the Spider*.

Tar'bell, Ida Minerva (1857-), an American author and editor, born in Erie County, Pa. She graduated at Allegheny College, and was associate editor of *The Chautauquan* from 1883 to 1891. During her visit to France, in 1891-94, she was a student at the Sorbonne and at the College of France.

She was associate editor of *McClure's Magazine*, 1894-1906, and later of the *American Magazine*. She has written extensively on history and current affairs. Her works include lives of Napoleon, Lincoln, and Madame Roland, *Short History of the Standard Oil Company*, and *He Knew Lincoln*.

Targum, a general name for the Aramaic versions of the Old Testament, whose origin is traceable to the Persian period of Jewish history, at which time Hebrew was superseded by Aramaic. The term is applied to any translation of an Old-Testament book into Aramaic. Extant Targums are three on the Pentateuch, one on the Prophets, and others on *Ruth*, *Psalms*, *Job*, *Proverbs*, *Song of Songs*, *Lamentations*, *Esther*, *Ecclesiastes*, and *Chronicles*. The corrupted text invalidates them for criticism, but they give useful hints concerning the life of their times.

Tar'iff, a schedule of duties or sums payable, imposed by a government on specified imported or exported goods, usually the former. These duties may be either specific, which are definite sums per unit, as so much per pound regardless of value; or *ad valorem*, a specified per cent of cost. Many tariffs contain both.

Tariffs are imposed for revenue, or protection, or both. A tariff for revenue is adjusted in its duties to pay large sums into the national treasury; its fees are therefore not so high as greatly to reduce the importation of goods. A protective tariff, on the other hand, proposes to stop the competition of imported goods with domestic products by making prohibitive the cost of importation for general distribution. Tariff for revenue only, or free trade, which is the absence of all duties, is the logical policy of a nation with extensive foreign commerce; for a community cannot sell goods abroad for any length of time without buying abroad to balance the trade. A strictly industrial country must import raw materials, and vice versa. A protective tariff is used to develop industry within a country by eliminating the competition of established foreign industry during the period of growth: it is also supported on the theory that it protects a high standard of living from depreciation under the competition of cheap labor of a lower standard.

As a matter of practice, few nations adhere strictly to either theory of tariff; invariably some items are admitted with light duties—usually articles not produced in the country and badly needed—and some native industries are protected.

ENGLAND. Tariffs in England began as sources of royal revenue, mostly on exports. The rise of manufacturing, however, introduced a policy of protection so long as the Kingdom was self-sustaining. As England became an exporting industrial nation this policy gradu-

ally gave way to free trade. The four acts of 1842, 1846, 1853, and 1860 remodeled the system in general, and the act of 1860 eliminated the bulk of protective duties. Free trade persisted through the World War, but in the post-war period the Conservative party became interested in protection as a possible remedy for industrial depression, and the tariff became a bone of contention in British politics.

FRANCE. Importation of manufactured goods was prohibited from the beginning of the 19th century until 1860, when Napoleon III reduced the tariff to a very light schedule. This policy did not suit the nation, and in 1890 a general protective tariff was readopted, which has not been changed in policy.

GERMANY. In 1834 a Zollverein, or customs union, was established by the German states, not then a united empire. It followed in the main the Prussian schedule of 1818, moderately protective. An experiment with light duties in the middle of the 19th century was followed by a reaction when agriculture suffered; in 1879 protection was restored, and has since been the German policy.

UNITED STATES. From its earliest history, the tariff has figured prominently in the politics of the United States. The break with Great Britain rose largely from the mother country's manner of imposing import duties. After the revolution and before the adoption of the constitution, the several colonies imposed many duties on commerce among themselves; the irksome nature of these was one of the strongest incentives for national unity.

In 1789 James Madison introduced into the First Congress a resolution calling for specific duties on certain imports and *ad valorem* duties on all others. The bill was signed by Washington on July 4. The chief object of this first tariff was revenue, but incidentally it carried a protective principle.

The tariff history of the nation from this time on involves the bitterest political controversy. Except in national crises, there have been few periods when the matter was not under dispute. The policy of protection was established more or less unconsciously by the early Federalists; it has been promoted by the industrial North and the parties that best represented it, as the Whigs and finally the Republicans, to protect growing industry and standards of living. Light duties were early demanded by the cotton-growing South, which had no manufactures, sold in foreign markets, and wished to be free to buy in those markets. This has been the traditional policy of the Democrats. The parties agreed on duties for revenue on luxuries and on imports, like coffee, tea, and raw silk, not producible in the country.

The history of tariff legislation falls into five periods: 1789-1816, 1816-1832, 1832-1846, 1846-1861, and 1861 to the present day.

The first period closed with the tariff act of 1816. Although the duties were lower than

would now be considered necessary for revenue, this was in effect a protective act. The main object was to pay the debt of the War of 1812; but to secure the necessary revenue a tariff was imposed higher than was necessary to meet the normal expenses of government, and after the need had passed, the tariff remained as a protective measure. This was the typical origin, until 1888, of protective schedules; they were enacted to produce revenue in crises, and after the crises ceased to exist the opposition to their repeal, by beneficiaries of the protection they extended, kept them in operation. This act of 1816 established the policy known as the American system, and the demand for its continuance, against the opposition of the South, characterized the second period. The benefits of the first act led to a demand for still higher duties; and the protectionists forced through the tariff of 1824 and the still more drastic act of 1828, which increased duties on such articles as wool, flax, iron, and steel to unprecedented heights. The bill was so obviously detrimental to the interests of agriculture that it was nicknamed the "Tariff of Abominations." The act of 1832 further exasperated the victims by removing most of the duties from their products; the dissatisfaction engendered by these measures embittered the South and led to the nullification proceedings in South Carolina. See NULLIFICATION.

The third period began with Henry Clay's compromise measure, under which duties were gradually to be reduced until 1842, after which date they should not exceed 20 per cent. In 1842, however, the Whigs passed as a party measure a high protective bill which remained in force until 1846. The pretext for the measure was the lack of revenue during the business depression of 1837; but, true to form, the protective duties remained after the necessity had passed.

The fourth period dates from the Walker tariff of 1846, a Democratic measure which remained in force 11 years. This act undertook a general reduction of duties, and made a strong discrimination between goods that could be produced in the United States and goods that could not. It was the nearest approach to free trade ever reached in the nation's history. It came at a time when other matters distracted attention, and was absorbed without perceptible effect. Popular interest was fixed by the possibilities of the new railroads, the settlement of the Mississippi Valley, and the California gold rush; and Congress was preoccupied with the growing antagonisms of slavery and slave territory. In 1845 a Canadian reciprocity treaty was ratified with Great Britain; it gave free entry to most food products and some other articles. The treaty was abrogated by the United States in 1866. A further reduction of the general tariff was made in 1857 because of a large treasury surplus; this remained in force until the outbreak of the Civil War.

Under Buchanan (1857-61) there rose a financial panic. The new Republican party was protectionist, and the outbreak of the Civil War, added to the panic, confirmed the party in its policy. To meet the war expenses the Morrill tariff acts of 1861 and 1862 were passed. These measures greatly increased duties on all imports. In 1864 they were again increased; the free list almost disappeared. The average rate of duty became 47.8 per cent. The ostensible purpose was again to increase revenue; but during the war manufactures flourished, currency depreciated, and wages and prices were correspondingly high. There was apparent general prosperity, and the majority of voters ascribed part of the good times to the policy of protection. Therefore, as usual, duties survived necessity. In 1882 Congress authorized the appointment of a tariff commission to investigate conditions and make recommendations. The commission recommended average reductions in duties of over 20 per cent, but Congress played havoc with the report, refused to revise on any consistent principle, made a few inconsequential changes, and concentrated on reducing internal revenue. The Cleveland administration (Democratic) was hampered in 1885-89 by a divided Congress, and could take no action.

In 1888, for the first time, the Republicans frankly advocated protection as a policy. They made the campaign of that year on this issue, pleading the necessity of protecting "infant industries" until they could stand on their own feet. The party won, and passed the McKinley protective tariff of 1890. The second Cleveland administration made an ineffectual attempt at reduction, but neither their act, the Dingley tariff of 1897, nor the Payne-Aldrich act of 1909 changed the policy in any vital feature.

The act of 1909, however, lost the Republicans their control. In the passage of the bill, the Senate had neutralized extensive reductions passed by the House; this aroused wide popular resentment and gave the Democrats command of the House in 1910. A downward revision then passed both houses, but was vetoed by President Taft. The 1909 act had established a tariff commission, and the President held that legislation should wait on its report. In 1912, however, the election of Wilson gave the Democrats both houses of Congress. Pursuant to their platform declaration against protection, they enacted the Underwood tariff of 1913, which remained in force for nine years. Its duties were for revenue only, at an average rate of 28 per cent.

The election of 1920 returned to power a group of extreme protectionist Republicans, in undisputed command of both houses of Congress. They passed the Fordney-McCumber act of 1922 with duties higher than any in national history, adding specific to *ad valorem* duties on a great part of its list. The bill was in effect a tariff wall about the nation. It protected not

only such new industries as the dye-and-chemical, but restored protection on the standard-of-living argument to established manufactures. It left the President considerable latitude to adjust duties on the advice of the tariff commission, with the understanding that they should be high enough to protect effectively. It was notable that the act met with no great resentment, even in the sections traditionally opposed to protection. The South seemed to find in its new manufacturing developments at least a palliation of the evils of protection. Organized labor was strongly in favor of the policy. Even the protests of the agricultural West were directed less against the principle than against certain inequities in its application. The tariff seemed less an issue than for many years.

The ablest critics have held that the United States tariff policy has been weak in its variability. It is believed that a nation can adjust itself to any policy—free trade, moderate protection, or extreme protection—but that consistency is to be desired. This has been lacking.

CANADA. Before their union, the several Provinces of Canada operated their own tariffs. Originally these incorporated differentials in favor of England; these disappeared before 1855 with the rise of free trade in the mother country. The general policy was for revenue. In 1854 Great Britain arranged a treaty of reciprocity between the United States and Canada; this was in force until 1866, when it was abrogated by the United States. In 1867, when the Dominion was formed, the resultant tariff was substantially an average of Provincial schedules.

There followed numerous tariff measures, most of them making few changes. In 1879 a protective measure was passed. The act of 1897 did not alter the policy, but included arrangements for reciprocal differentials which were subsequently arranged with the most important commercial nations of the world, except the United States. Reciprocity with the United States was from this time a live issue, but arrangements were always blocked on one or the other side. In 1906-7 was enacted another highly protective revision, incorporating three scales; a general scale, a preferential scale for the United Kingdom and the colonies, and an intermediate scale to be used for negotiations with foreign countries. Surtaxes were also provided for use against nations discriminating against Canada. The following years were spent in making arrangements with foreign nations. From 1903 to 1910 there was a costly tariff war with Germany.

In 1911 the Conservatives established a tariff commission to study conditions and report. The World War broke out before action was taken. In 1915 a special act was passed for war revenue; this was repealed in 1919. Post-war sentiment demanded reductions; the commission, however, was engaged in the study of complicated conditions, and slowness in making re-

ductions led to the overthrow of one Conservative government. Some reductions were made between 1924 and 1927, but the tariff remained a live political issue.

Tarkington, Newton Booth (1869-), American novelist and playwright, was born in Indianapolis and educated at Exeter Academy and Purdue and Princeton universities. His literary work began at Princeton, where he helped revive the *Tiger*. After leaving the university, he wrote fiction for some years with no acceptances; but the publication of his novel, *The Gentleman from Indiana*, (1899) was an opening wedge, and its successor, *Monsieur Beaucaire*, established his reputation.

Tarkington occupies a unique place in American literature. He is a close student of the national character of the United States, and most of his novels are based on the personalities of its citizens; but unlike most realists in fiction he preserves a cheerful optimism concerning the trends of his time. He recognizes that humanity is not logical, but feels that its weaknesses are rather matters for sympathetic humor than cause for despair. He does not share the distaste of some of his contemporaries for big business and the Rotary Club. A diverting phase of his writing is found in his studies of boyhood, (*Penrod*, *Seventeen*), which, whatever the soundness of their psychology, are unquestionably mirth-provoking.

Tarkington's fiction includes the novels, *Alice Adams*, *The Conquest of Canaan*, *Seventeen*, *The Midlander*, and *The Plutocrat*, and such short story collections as *Women* and *Penrod and Sam*. His plays have been popular successes.

Tarpeian Tar pe' yan, Rock, a cliff of the Capitoline Hill, Rome, from which traitors were hurled, named for the legendary Tarpeia, daughter of the governor of the citadel, who betrayed the city to the Sabine troops, asking as reward "what they wore on their left arms." She meant their golden bracelets, but once within the walls they crushed her beneath their shields. She was buried at the foot of the Rock.

Tar'pon, a large game fish of the Elopod Family, found in West Indian waters and off the coast of Florida. It is a favorite fish among anglers, although the flesh is not of good quality. The tarpon is a salmon-like fish with large scales and a straight back, upon which the last ray of the dorsal fin is greatly prolonged; the caudal fin is forked and the ventral and pectoral fins are small. It reaches six feet in length and may weigh 100 pounds. Because of its glistening appearance the tarpon is often called the silver king.

Tarquin, *Tahr' kwin*, the family name of two legendary kings of Rome. The first of these, whose full name was Lucius Tarquinius Priscus, succeeded Ancus Marcius in 616 B. C. He waged wars, subdued the cities of Etruria and forced them to do him homage. He is also credited with the construction of magnificent sewers, with the laying out of the Campus Martius, the institution of the Roman games and also the foundation of the Capitoline Temple. He was assassinated in 578 B. C. and was succeeded by Servius Tullius.

Tarquin the Proud (Lucius Tarquinius Superbus), son of the first Tarquin, usurped the throne in 534 B. C. This ruler was a representative of the nobles rather than of the common people. He made Rome more important in the Latin League, successfully attacked the Volscians and completed the building of the Temple of Jupiter Capitolinus. He imposed such heavy taxes, however, that all classes of people grew dissatisfied. While he was conducting the siege of the town of Ardea, the people, enraged by the report of the infamous behavior of the King's son, set up a revolt (510 B. C.) and established a republic. Tarquin the Proud died in Cumæ, after three attempts to restore the monarchy had failed. See **ROME**, **ANCIENT**, subhead *History*.

Tar'rytown, N. Y., a city of Westchester Co., about 25 m. n. of New York City, on the Hudson River, which expands at this point into Tappan Bay,

and on the New York Central & Hudson River Railroad. A steam ferry plies across the river to Nyack and gives Tarrytown the advantages of the West Shore Railroad. The city is picturesquely located and has many handsome residences. The well-known school called "The Castle," the Irving Institute and the Tarrytown Lyceum are located here. Tarrytown is one of the oldest settlements in New York State, and during the Revolutionary War every prominent hill in the vicinity was the scene of an encounter. André was captured here and a monument commemorating this event stands on Broadway, the street connecting with the road to Sleepy Hollow, made famous by Washington Irving. A tiny near-by brook is named André Brook, and a large whitewood was called the André Tree. Irving was born in Tarrytown, and his home named Sunnyside still stands south of the city. On the north is Sleepy Hollow, where he was buried. Tarrytown has a number of manufacturing interests, including drills and farm implements. Population in 1910, 5600. In 1920, 5807.

Tar'tan, a cloth of checked pattern, also known as plaid. The Scottish Gaelic tartan is common to the Highlands, where each clan wears its own plaid as a sort of uniform.

Tartaric, *Tar tair' ik*, **Acid**, an acid originally found in argol as a deposit from wine casks, but existing generally in combination with the juices of certain fruits and vegetables, such as the grape, mulberry, mountain-ash berry, pineapple, cucumber, tamarind, etc. In grape juice it is found as the acid potassium tartrate, and during fermentation it is gradually deposited in the form of a hard crust called tartar or argol. See **CREAM OF TARTAR**.

Tartaric acid is prepared from the tartar as follows: First, it is decolorized and then dissolved in water with carbonate of lime, which precipitates the tartaric acid as tartrate of lime (calcium tartrate). This is next washed and filtered, and then treated with weak

sulphuric acid to form insoluble calcium sulphate, and to set free in the solution the tartaric acid. From this liquor by recrystallization and purification the large white crystals of the tartaric acid are obtained, which are very soluble in water and intensely sour to the taste. They are employed in medicine, in baking powders and calico printing.

Tar'tars, or **Tatars**, *Tah' tarz*, a name used more or less vaguely to designate people of Mongolian and Turkish race. The name was first applied to the Mongolians who came from the Altai plateaus and raided the lowlands of China, and the Europeans designated as Tartars the Mongolian, Tungusian and Turkish races that came into Europe with Genghis Khan. The Russians apply the term to certain people speaking Turkish and living in Siberia, the Caucasus, and central and eastern Russia.

Tar'tarus, according to Homer and early Greek mythology, a dark abyss as far below Hades as the earth was below heaven. It was the place in which Jupiter imprisoned all who rebelled against his authority. Later Tartarus was considered to be the place where the wicked met their just punishment. It was sometimes spoken of as Hades.

Tasmania, *Taz ma' ni a*, an island lying south of Australia, from which it is separated by Bass Strait. It is a possession of the British Empire and a state of the Australian Commonwealth. It is of somewhat rectangular shape and has an area of 26,215 sq. m., about the same as that of West Virginia. The greater part of Tasmania is a plateau 3000 ft. above the level of the sea, having many lakes of great beauty. At the west are short mountain ranges, the highest peak of which is Cradle Mountain, 5069 ft. in height. There are several rivers of more or less importance; chief among these is the Derwent, 130 m. in length. The island was once luxuriantly wooded and extensive eucalyptus groves still remain. Fruits, oats, wheat, barley and potatoes are the principal crops. Two animals, the Tas-

manian wolf and the Tasmanian devil, both Marsupials, or pouched animals, are peculiar to the island. The climate is mild and pleasing. Stock raising, mining and whaling are the chief industries, although the latter is of less importance than formerly.

Tasmania has a governor appointed by the Crown, and the Legislature consists of two houses. The island was discovered by Tasman in 1642, and was named Van Diemen's Land in honor of the governor of the East Indies. It became a British colony in 1803 and a state of the Commonwealth in 1901. The aboriginal inhabitants are now nearly extinct, and the population consists chiefly of people from other Australian colonies. For governmental purposes it is divided into 18 counties. Hobart is the capital city. Population, about 215,000.

Tasmanian, *Taz ma' ni an*, **Wolf**, or **Thylacine**, *Thi' la sine*, a Marsupial of the Dasyure Family, found in Australia and rapidly being exterminated because of its depredations against sheepfolds. It is a wolflike animal with pointed muzzle, strong jaws and long incisor teeth. Its smooth-coated body tapers to the long, thin tail; in general its color is brown but the back is marked with transverse black lines. These wolves overran Tasmania before the coming of the colonists.

Tas'so, **Torquato** (1544-1595), an Italian poet, born at Sorrento. Already at the age of eight the precocity of the child had attracted attention, and in 1557, when his father secured a position in the court of Urbino, the young boy was thrown in the midst of professional courtiers and enjoyed a life of refined luxury. He studied at Venice and at the University of Padua, but showed greater inclination for literature and philosophy than for law. His first poem, *Rinaldo*, published at Venice in 1562, showed marked originality. After studying at Bologna he entered the service of Cardinal Luigi d'Este, in 1565, and several happy years followed, end-

ing, however, in a disagreement between the patron and the poet in 1570. Thereupon Tasso took service with Duke Alfonso II of Ferrara. Here he produced his greatest work, the pastoral drama, *Aminta*, and the commanding epic poem, the *Jerusalem Delivered*.

Tasso now submitted his epic to critics who made vain efforts to criticize a work far beyond their powers. The worry caused by their varied suggestions, as well as overwork, almost drove the poet mad, and Duke Alfonso, after showing unusual forbearance, was forced to imprison him in the madhouse of St. Anna. He was removed in 1586, and lived in the household of Vincenzo Gonzaga, until, hungering for the splendor of court life, he set forth on a weary journey back and forth between Rome, Mantua, Florence and Naples. At last Pope Clement VIII invited the poet to Rome to receive the crown of bays, but the honors came too late. His life of wandering, of misery, of hopes deferred and of slow decline holds almost as great an attraction for the world as does his verse, steeped as it is in melancholy, and breathing of sentiment noble and refined. In addition to the *Aminta* and *Jerusalem Delivered* he produced *Discourse on the Art of Poetry*, *Il Monte Oliveto*, *Rime* and dialogues on æsthetical and philosophical subjects.

Taste, the sense by means of which flavors are detected. The taste bulbs in the papillæ of the tongue constitute the organ of taste. In these bulbs terminate the nerves of taste, although the bulbs have been found in the soft palate, pharynx, tonsils and other parts of the throat. The taste bulbs are minute barrel-shaped bodies, about 1/800 of an inch in length, embedded in the papillæ of the tongue (See TONGUE). As they lie deep in the fold of the papillæ, they can be reached only by substances in liquid form. A particle of dry sugar must first be dissolved by the saliva before its sweetness can be tasted. As many as 1700 of these bulbs have been counted on a single papilla.

Four elementary taste qualities have been named, salty, sweet, sour and bitter. To these some physiologists would add metallic and alkaline. Certain regions of the tongue are sensitive to bitter, other parts to sweet. In most persons the tip is sensitive to sweet or sour, the base to bitter; but this is not invariably the case. Another singular fact in connection with this sense is that some substances produce one taste in one part of the mouth and another taste in another part. There are many flavors which are really smells. From some tasteless substances odorous particles pass from the mouth to the olfactories, or nerves of smell, and become identified with the particular substance as taste. This is the case with most spices and with wines. Again, the taste sense is aided by smell, and mild flavors may, when the accompanying odor is sensed, seem much stronger. Some paralyze certain taste bulbs, while not affecting others. Taste, like other senses, is susceptible of cultivation. Wine, butter and tea tasters develop an exceptionally keen discrimination between the differing qualities of these articles and become expert judges.

The perception of taste is a mental as well as a physical process. The current set up by a stimulation of the taste bulbs passes over the nerve fibers connected with them and makes an impression on the gustatory centers of the brain, and the sensation is there interpreted as taste. See BRAIN.

Tattoo'ing, the practice of puncturing a design into the skin, and coloring it with indelible pigments. It is thought to have originated through a desire for ornamentation. Later it came to have religious significance and the skin was adorned with signs and emblems, often presenting a brilliant, ferocious appearance. It has been a universal practice among uncivilized nations. Sailors make use of tattooing, but with them it has naturally no historic or religious value. Negroes, Indians, Australians and South Sea Islanders still indulge in the prac-

tice. It was forbidden to the Jews under the Mosaic Law (*Lev. xix, 28*). It is a mark of courage among those who practice it.

Taun'ton, Mass., a city and one of the county seats of Bristol Co., 35 m. s. of Boston and 16 m. n. of Fall River, on the Taunton River, at the head of ocean navigation, and on the New York, New Haven & Hartford and other railroads. Interurban electric railroads connect with Fall River, Providence, New Bedford and Boston. The Fall River line of steamers which have connection with New York and other cities are so easily reached that Taunton has practically water connection with many Atlantic ports. The city has an area of 44 sq. m. The villages of Britannia-ville, Oakland, Whittenton, Hopewell, Weir and East Taunton are within the corporate limits of the city, Weir being the chief port. There are several public parks, of which Taunton Green and Woodward Springs parks are the most noteworthy. The city is handsomely built and contains interesting specimens of colonial architecture. It was one of the first cities in the United States to own and operate an electric light plant.

INSTITUTIONS. Among the principal institutions and public buildings are the Morton Hospital, the Old Colony Historical Society, Bristol Academy, St. Mary's Academy, a public library, an old ladies' home, an emergency hospital and state hospitals for the insane. At Norton, directly north of Taunton, is Wheaton Seminary for girls, which was founded in 1834.

INDUSTRIES. Taunton's industrial importance began in 1656 with the establishment of ironworks, and the plant then opened continued in active operation over 200 years. The herring fisheries give employment to a large number of workers during a considerable part of the year. The coastwise trade is especially important, large shipments of coal being made here for inland cities, and grain, vegetables, poultry and the varied manufactured products are shipped to

outside markets. The extensive industries are represented by machine shops, foundries, cotton and woolen mills, locomotive works and manufactories of cutlery, machinists' tools, shoe buttons and eyelets, tacks, jewelry, stoves and stove linings, silver and britannia ware, pearl buttons, kitchen utensils, brick, copper, aluminum and other metal goods, printing presses and oilcloth.

HISTORY. The first permanent settlement was made in 1638. The place was first called Cohannet, but when it was incorporated in 1639 the name was changed to Taunton after the English town of the same name. William Hooke, the first minister, returned to England as chaplain to Oliver Cromwell. The first crucibles for smelting copper in America were made here, and from them disks for copper cents were supplied to the United States Government in large amounts. Robert Treat Paine, one of the signers of the Declaration of Independence, for whom a statue has been erected near the city hall, resided here. A city charter was granted in 1864, but a new charter was given in 1909. Pop., 1920, 37,137; State census, 1925, 39,286.

Tau'rus, The Bull, the second sign of the zodiac and one of the most distinctly marked constellations in the heavens. The sun enters Taurus about the 20th of April. The constellation is marked by two groups of stars, one of which forms the letter V and is called the Hyades. The bright red star Aldebaran is the most conspicuous star in the group. The other group is the Pleiades, a cluster of seven stars, only six of which can usually be seen by the naked eye. Taurus contains 145 stars. The symbol is ♂, supposed to represent the head and horns of the bull. See ALDEBARAN; CONSTELLATIONS; STARS; ZODIAC.

Taurus Mountains, a range in the southern part of Asia Minor, forming the southern boundary of the Anatolian Plateau, and extending from the Euphrates to the Ægean Sea. Its greatest height, near the eastern end, is about

10,000 ft. Numerous river valleys, and principally that of the Sihun, break its continuity, and a northeastern extension, the Anti-Taurus, is completely separated from the main range.

Tax, a revenue obtained by authority, from property, income or the person, or all three, and used for public purposes. Taxes are direct and indirect. Direct taxes are those levied upon the person or property which pays them. Poll taxes, inheritance taxes and state and local taxes are direct. Indirect taxes are levied upon one party and paid by another. Duties and excise taxes are indirect. Duties are taxes levied upon imports; excise taxes are those levied upon certain manufactures within the country, such as spirituous liquors and tobacco. In all cases the tax is added to the price of the commodity and paid by the consumer. Indirect taxes are the more popular because few consumers realize that they are paying them. See **TARIFF**.

Direct taxes are levied upon persons and property and must be uniform within the political division to which they apply, whether it be a state or a school district. They are levied by the officials having the authority within the political unit. The laws vary in detail in different states, but usually the board of county commissioners determines the rate of taxation for the county and the board of school directors for the school district. There is always a limit fixed by law, above which the taxes cannot be raised. Once a year, usually in April or May, every citizen 21 years of age or over is required to file with the taxing authorities a schedule of his personal property and once in five years the real estate is appraised. The rate of taxation is determined by comparing the public revenue required with the value of the property thus represented; that is, if the revenue were $\frac{1}{50}$ of the valuation, the rate of taxation would be two per cent.

POLL TAX. This is a tax assessed upon every legal voter, regardless of his income or the value of his property. The poll tax must be uniform within the taxing unit. It is usually applied to the

construction and repair of highways. In most states, when a man has reached a certain age he is exempt from poll tax.

INHERITANCE TAX. This is an assessment or charge on the succession of property from a deceased person to his heirs or legatees. The inheritance tax was first levied in the Roman Empire to raise money for the support of the army, and has been a source of revenue in several of the Continental countries of Europe almost since their organization as independent governments. In England the various inheritance tax charges were called "death duties" by Gladstone and the name has since come into common usage. Taxes of a similar nature were imposed by the Government of the United States as a part of its internal-revenue system during the Civil War, but were repealed after its close. A number of the states have statutes in force upon inheritances, and large revenues accrue from this source.

INCOME TAX. This is a tax levied upon the income of individuals or citizens for the support of the government. Such a tax may be levied directly upon persons receiving the income, or it may be collected in the form of a tax upon dividends, interest on bonds, etc. Such taxes are levied regularly in Great Britain. In the United States, an act was passed in 1861, creating an income tax of three per cent on the excess over \$800. A number of changes as to rate and minimum income subject to taxation were later made in the act before 1872, when the tax was abolished. An income-tax law passed in 1894 was declared unconstitutional. Early in 1913, however, the Sixteenth Amendment to the Constitution, providing for the legalizing of the income tax, was ratified by the requisite number of states, and became a part of the Constitution.

SINGLE TAX. This is a tax upon the value of land and one sufficient to meet all the expenses of the government. Some of the principles underlying the single tax were advanced by a school of French political economists known as Physiocrats, in the 18th century, but the

theory was first developed by Henry George of New York in his work *Progress and Poverty*, published in 1879 (See GEORGE, HENRY). George based his theory upon the assumptions: (1) that the land of any country belongs by right to all the people of that country and that all should share equally in the social benefits derived from it; (2) that this right cannot be alienated by any one generation so as to affect its title to the next; (3) that absolute private ownership in land has no more moral foundation than has private ownership in air and sunlight; (4) that private possession and use of land are right and necessary to the welfare of society, subject to periodical payments for the value of the land in contradistinction to the value of improvements in or on the land. By applying the rent of land, exclusive of all improvements, to the equal benefit of the entire community, justice would be done to all.

The advocates of the single tax further claim: (1) that it will prevent holding land for speculative purposes; (2) that it will stimulate industry and increase production, because it removes all taxes, as well as exorbitant rent, from industrial enterprises; (3) that it would consequently increase social wealth; (4) that extreme want and poverty would be abolished; (5) that this would lead to an advance in civilization impossible under present economic industrial conditions.

The advocates of single tax realize that it must be brought about gradually, and that progressive legislation is of prime importance in leading a majority of the people to the acceptance of their views. While a few organizations have been formed for the express purpose of spreading the single tax idea, the great majority of those who favor the reform believe that it can best be accomplished without propagating it as a separate political movement.

Opposing Arguments. With few exceptions political economists are opposed to the extreme theories advocated by the single taxers. The leading ob-

jections are: (1) that owners of land have purchased the land with the results of their labor, and that they have as much right to it as to any other form of wealth, and to deprive them of this land would be unjust; to which it is replied that this argument would justify any other form of institutional wrong, such as slavery; (2) that a single tax would not raise sufficient revenue, and is, therefore, impractical; to which it is replied that this can be determined only by experience; (3) that it would raise too much revenue and is, therefore, unwise; (4) that ownership of land is the foundation of civilized society, and to remove this foundation would be dangerous in the extreme; (5) that the single tax is inflexible and would not enable the government to raise extra revenue in time of need, as in case of war; (6) that the single tax does not enable the government to prevent, or, at least, to curtail the production of undesirable products, as tobacco, intoxicating liquors and certain harmful drugs. Consult George's *Progress and Poverty*, *Social Problems*, *Conditions of Labor* and *Protection or Free Trade*; and Shearman's *Natural Taxation*.

Tax'idér'my, the art of preparing and preserving the skins of animals and of mounting them in a lifelike manner. Small animals are prepared by removing the skins and scraping away all the flesh clinging to them, and by cleaning the large bones and drying them. The skins are rubbed well with arsenical soap to make them supple and to prevent decay. They are then stuffed and mounted, glass eyes being used. A powder containing arsenic is generally employed in preparing the skins of large animals. The art is a very old one, but it requires considerable skill to mount the specimens so that they resemble the living subject in form, pose and expression. Birds, reptiles and fish are also preserved and mounted. Special works on taxidermy are published, giving the methods in all details.

Tay, a river of Scotland, rising as the Dochart on the border of Argyll-

shire. It flows east through the beautiful Loch Tay, then southeast and northeast, and, as the Firth of Tay, enters the North Sea, 10 m. below Dundee. Its length is 118 m. and it is navigable for small vessels to Perth. An iron railroad bridge spans its estuary.

Tay'lor, Graham (1851-), an American sociologist, born in Schenectady, N. Y. He was educated at Rutgers College and the Reformed Theological Seminary, New Brunswick, N. J. In 1873 he was ordained to the Dutch Reformed ministry, and began preaching in Hopewell, N. Y. From 1888 to 1892 he was professor of practical theology at the Hartford Theological Seminary. Since 1892 he has been professor of social economics at the Chicago Theological Seminary, and since 1903, professorial lecturer in sociology at the University of Chicago. He is the founder and resident warden of the Chicago Commons Social Settlement and associate editor of the *Chicago Survey*, and takes an active part in all movements for the social uplift of his city.

Taylor, (James) Bayard (1825-1878), an American writer, born in Kennett Square, Pa. After studying at West Chester and Unionville, serving for a time as an apprentice to a printer and publishing a volume of poems, he went to Europe, and from 1844 to 1846 traveled, chiefly on foot, in Great Britain, Belgium, Germany, Austria, Italy and France. On his return, his letters describing these travels were published under the title *Views Afoot, or Europe Seen with Knapsack and Staff*. In 1847 he joined the staff of the *New York Tribune*. Thereafter he traveled, lectured and published volumes of poetry, novels and books of travel, besides a translation of Goethe's *Faust* in the original meters, his most admirable work. He became United States ambassador at Berlin shortly before his death. Among his voluminous writings may be mentioned the travel books, *Northern Travel*, *At Home and Abroad* and *Byways of Europe*; the novels, *Hannah Thurston*,

John Godfrey's Fortunes and *The Story of Kennett*; and several volumes of verse, including *A Book of Romances*, *Lyrics*, and *Songs and Poems of the Orient*.

Taylor, Jeremy (1613-1667), a celebrated English divine, born in Cambridge, the son of a barber. He entered Caius College when 13, and after seven years of brilliant study, took his master's degree and entered holy orders. Having attracted the notice of Archbishop Laud, he secured a fellowship at Oxford in 1636, about the same time being appointed chaplain in ordinary to the King. Two years later he became rector of Uppingham, which preferment he lost with Parliament's ascendancy over the King. During subsequent years of enforced seclusion, he wrote all his great works. These include *Life of Christ*, *Liberty of Prophesying*, *The Rule and Exercises of Holy Living*, *The Rule and Exercises of Holy Dying* (of which the last two are classics of English devotion), and *Ductor Dubitantium, or the Rule of Conscience in all her General Measures*. In 1660 he was made a bishop. For wealth of fancy, Taylor's eloquence is unequaled among ecclesiastical writers.

Taylor, Pa., a city of Lackawanna Co., 4 m. s.w. of Scranton, on the Lackawanna River and on the Delaware, Lackawanna & Western and the Central of New Jersey railroads. The town was settled in 1790 and incorporated in 1893. It is situated in the anthracite region of the noted Lackawanna Valley and coal mining and shipping is the chief industry. Silk manufacturing is also carried on. Population in 1920, 9876.

Taylor, Zachary (1784-1850), twelfth president of the United States, born in Orange County, Va. He was the son of Richard Taylor, a conspicuously gallant colonel of the Revolutionary War, who, in 1785, when Zachary was an infant, removed to the sparsely settled frontier in Kentucky. Brought up on a farm in this new country, the son enjoyed few school advantages; but he was

forced by circumstances to learn lessons of thrift, industry and independence. In 1808 he became a lieutenant in the army, and two years later was made captain. When the War of 1812 broke out he was ordered to Indiana, and at Ft. Harrison he repulsed an Indian attack under Tecumseh. In 1814 he conducted a successful campaign against the British and Indians on Rock River. He became lieutenant-colonel in 1819, in command at Ft. Snelling, and was made colonel in 1832, with headquarters at Prairie du Chien, Wis.

After serving during the Black Hawk War in 1832, he was ordered to Florida in 1836 for service against the Seminole Indians. He defeated them in the decisive Battle of Okeechobee, was brevetted brigadier-general, and in 1838 was appointed to the chief command in Florida. In 1840 he was transferred to a command in the Southwestern department of the army. When Texas was annexed to the United States in 1845, Taylor was sent to defend it from the threatened invasion of Mexico. Occupying Corpus Christi with a force of 4000 men, he advanced across the disputed territory, under President Polk's orders, to the bank of the Rio Grande, gained the victory of Palo Alto on May 8, 1846, and of Resaca de la Palma the following day, and occupied Matamoros, on the western bank of the river. Monterey was captured by him in September, and the following February, now a major-general, he gained a brilliant victory at Buena Vista over greatly superior forces under Santa Anna. He was nicknamed "Old Rough and Ready" by his soldiers, became a national hero and received the thanks of Congress.

On his war record General Taylor was nominated for the presidency of the United States by the Whig Party, and was elected after an exciting campaign. The admission of California, the settlement of the boundaries of Texas, and the organization of the new territory acquired from Mexico, all complicated with the slavery question, were the issues

confronting the new administration. But after 16 months in office, before it had been determined whether the qualities that had made him a successful general would also give him victory in the difficult problems of State, the President died and was succeeded by Vice-President Millard Fillmore. His son, Richard Taylor, became an officer in the Confederate army, and one of his daughters married Jefferson Davis.

Tchad, *Chahd*, Chad or Tsad, a lake in central Africa, situated in the French military territory of Tchad and surrounded by Bornu, Wadai, Bagirmi and Kanem. Its area varies with the rainfall, increasing from 6000 to nearly 40,000 sq. m. It receives the water of the Shari and the Yeu, and has no regular outlet. Reeds and other water plants cover its shallow margins. It contains many large turtles, crocodiles and fish.

Tea, *Tee*, a low shrub or the leaves of the same shrub, a member of the Tea Family, from which a popular beverage, also called tea, is prepared. The plant itself is bushy, and if uncultivated attains the height of a small tree; owing to the pruning necessary to preserve a leafy, bushy form the cultivated varieties are smaller. The leaves are stiff and leathery, long-oval in form and sharply-toothed. The flowers are creamy white or rose-colored and have a delicate fragrance; the curving petals and many yellow stamens contrasted with the dark green stems and sepals give them a strikingly lovely appearance, either singly or in clusters. The fruit is a dry, three-celled, one-seeded case.

Tea, the drink made from the dried leaves, has been known since earliest times, but up to 500 A. D. it was used medicinally. As a drink, tea became common in England in the 17th century and Pepys mentions in his *Diary* that he "drank of the new China beverage." At present the total export of tea is over 850,000,000 lb. annually, and this amount of course does not include that consumed in the countries where it is

FOUR STEPS IN TEA CULTURE



The leaves are picked by hand.



The simplest scales are used for weighing.



The leaves are heated to loosen the oils.



The tea is sorted by sifting.



A PANORAMA OF SEOUL, THE ANCIENT CAPITAL OF KOREA

raised. Of the exported tea, England uses about one-half; Canada, Holland, the United States and Russia follow, using, however, much less.

The two kinds of tea, black and green, are prepared from the same leaves, but by different processes. In both cases the leaves are picked by hand, the best varieties being those prepared from the youngest shoots, and then heated in furnaces to loosen the oils. These oils are next worked out either by machinery or by hand. If black tea is to be the product, the leaves are allowed to ferment before drying; otherwise they are dried, rolled, sorted and packed. The different varieties placed upon the market are the results of this sorting process, which separates the finer from the coarser leaves. Brick tea, tablet tea and tea dust are cakes made from the broken or powdered leaves and are of varying degrees of purity. The crop is harvested three times a year, and the best grades are obtained from the second picking.

Tea is raised best in the moist, sub-tropical countries; India, China, Ceylon and the East Indies are noted for its production.

Teak, *Teek*, a tall East Indian tree of the Verbenaceae Family, known for its valuable lumber and large leaves. The strong, yellowish-brown wood has long been used for shipbuilding and is a favorite for hand-carved idols, horrible to view but exquisitely carved. The leaves of the teak are from one to two feet in length and are the source of a red dye. Teakwood resembles mahogany, is nearly as valuable and is more durable, but is lighter than oak. African teak furnishes a timber similar to that of the East Indian species.

Teal, *Teel*, birds belonging to the Duck and Goose Family, of which the green-winged teal is perhaps the best known. It is about 15 inches long, with a buff-colored breast spotted with black, a gray back crossed by a white bar, fine black and white lines on shoulders and sides, and black and white wings, bordered

with buff and white. The head is chestnut, with a green and black mark surrounding each eye and extending back to the crest. The female is more dusky, mottled with buff, with whitish throat and abdomen. The nest is made of grass, is lined with down and is placed on the ground in a tuft of grass or among willows. Nine to eighteen buff-colored eggs are laid.

GREEN-WINGED TEAL. This is a duck of the marsh, creeks and small ponds, where it may be seen feeding by reaching its head to the bottom of shallow water.

Teasel, *Te' zel*, a coarse plant of the Teasel Family, known chiefly through fuller's teasel, which is used in raising the nap on woolen cloth. It is a stout, thistlelike herb with angled stems, growing to a height of four or five feet. The leaves are long, and though generally uncut, may be deeply-lobed. They are stemless and are apt to be so united about the stem as to form a cup in which rain is caught and held. The flowers are in dense heads, much like those of plants of the Composite Family, and are surrounded by several rows of sharp, rigid scales called bracts. The flowers are tubular, blue or lilac in color, and have four or five irregular lobes and four unequal stamens. The heads of the flowers are the parts made use of by clothiers. They are split in halves and fastened to a flat wheel or card which is revolved rapidly against the surface of the cloth. This method, which has long been in use, seems to continue to surpass all suggested mechanical devices for accomplishing the purpose. The large central heads, called king teasels, are used for raising the nap on blankets; the queen teasels, or second largest, are used for the cloth of men's overcoats, etc.; and the tiny, low-growing, half-developed buttons are used for broadcloth and the finest woolens. Fuller's teasel is grown in New York, Russia and Avignon, France, and is, in these localities, an important crop. Common teasel is a roadside weed with less stiff heads of

blossoms, and hence useless in woolen manufacture.

Tecumseh, *Te kum' seh*, (about 1768-1813), an Indian chief of the Shawnee tribe. Together with his brother he organized the Indian tribes into a confederacy which was to resist the invasion of the whites into the red man's territory. In the Battle of Tippecanoe, in November, 311, the Indians were defeated. Tecumseh joined the British in the War of 1812, and was killed in the battle on the Thames River.

Ted'der, a machine for scattering or spreading grass or hay. It consists of a frame set with steel forks which distribute the hay evenly over the field. The frame is upon wheels, has a seat for the driver and is a single-horse machine. The action of the forks is partly automatic, to prevent breakage when obstructions are met, and the driver operates it partly by means of a lever.

Teeth, the hard, bonelike structures in the mouth of most Vertebrates, which serve primarily to masticate food. They vary somewhat according to the life of the animal. The teeth of carnivorous animals are sharp and adapted for rending flesh; those of herbivorous animals, like the ox, are grinders for reducing grass to pulp. In the higher Mammals a set of temporary teeth is developed, which is soon replaced by a permanent set. The teeth of the fish are shed at different stages of its life and repeatedly renewed.

The human teeth, which, in the adult, are 32 in number, are implanted in sockets in the upper and lower jaw bones. They are of similar structure and the same composition. Each has a crown, the visible part above the gum; a fang, or root, embedded in the jaw bone; and a neck, or cervix, between these two ends. Most of the bulk of the tooth is made up of a hard, resisting substance called dentine. The dentine of the root is covered with a layer of cement, that of the crown with enamel, the hardest substance in the body. In the center of the tooth, extending from

fang to crown, is a cavity filled with a soft, pulpy substance, interspersed with nerves and blood vessels.

Starting in the middle line of the body the teeth are arranged above and below as follows: two incisors, one canine, two bicuspid, three molars. The incisors are sharp and chisel-shaped at the upper edge and are designed for seizing and cutting food. Each has one fang. The canines, which in the upper jaw are called eye teeth, are a trifle larger than the incisors. Their crowns are somewhat conical, with a single point, or cusp, on the upper edge. The bicuspid are shorter than the canines, with cube-shaped crowns. Each has two cusps and a grooved fang. The molars have large crowns with broad surfaces, suitable for grinding, and several fangs.

The first teeth to develop after birth are the incisors, which appear when the child is about seven months old. At nine months the first molars cut through, and at 11 months, the first canines. The child cuts his last molars at the age of two or three years. The full set of temporary, or milk, teeth consists of eight incisors, four canines and eight molars—28 in all. The permanent teeth, which form in the jaw bone below the temporary set, push upward and loosen the milk teeth, which fall out from time to time, giving place to the stronger, permanent set. The end molars, called wisdom teeth, are the last to develop, appearing between 17 and 23 years. Neglect of the teeth causes them to decay, and for this reason great care should be exercised in removing with a brush and water the particles of food left in the crevices between them after eating.

Tegnér, *Teg' nar*", **Esaias** (1782-1846), a Swedish poet, born in Kyrkerud, Wermland. In 1825 he accepted the position of bishop at Wexiö, with the accompanying heavy duties. His writings are among the best his country has produced,—admirable in artistic finish, melody, vigor and national enthusiasm. They include *The Priest's Consecration*, *The Children of the Lord's Supper*

(translated by Longfellow), *Axel and Frithjof's Saga*, a masterly epic, 22 times translated into English.

Teheran, *Te h'rahn'*, the capital of Persia, situated near the foot of the Elburz Mountain, 70 m. s. of the Caspian Sea. It is surrounded by a wall, and the 12 large gates are closed at night. The distinctly Oriental features of the city are rapidly giving way to Western architecture, and the newer parts with their street railways and well-lighted streets are in marked contrast to the hovels and dingy quarters of the old

more healthful climates. Population, about 220,000.

Telegraph, *Tel' e graf*, the name given to the apparatus for the transmission of intelligence to a distance by means of signals made by an electric current. The signals may be written, auditory or visual; in the common land lines the signals are auditory. The essential parts of a simple land line are: the main batteries or small dynamo and line, in circuit with which are the switches, keys and relays; several local circuits, in each of which is a local battery and a sounder.

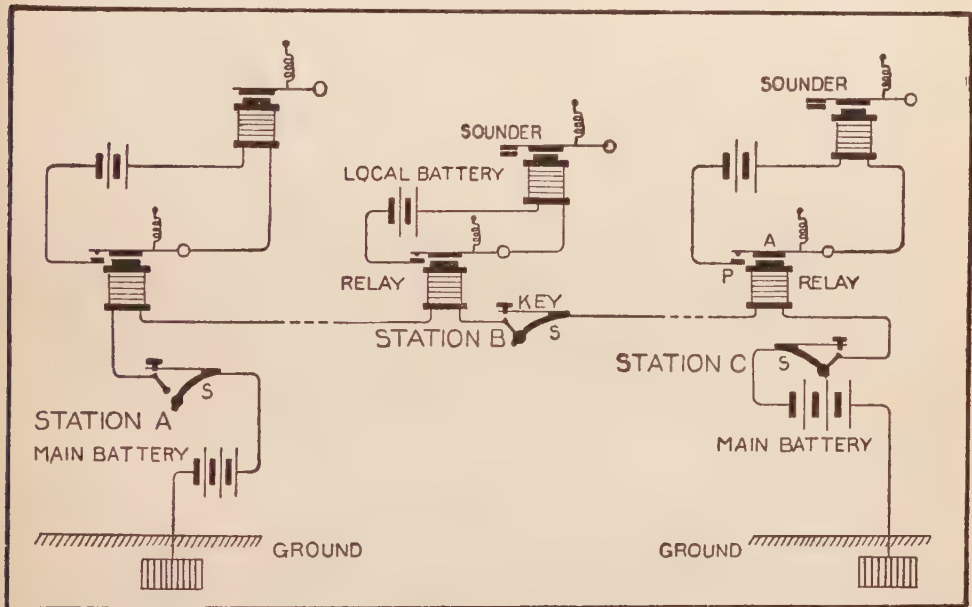


FIGURE 1

town. There are numerous mosques and bazaars, a large military parade ground, the caravanserai built by Mirza Taki Khan, the modern foreign, war and customs offices, the shah's palace, the royal museum, a polytechnic school and the Kings' College. The city was extensively enlarged by Nasr-ed-Din Shah. Prior to the improvements made in the sanitary conditions it was very unhealthy, raging fevers during the summer causing the population to resort to

The general arrangement for such a line connecting three stations is shown in Figure 1.

The key, combined with the switch, is shown separately in Figure 2, and is simply a circuit breaker. When no message is being sent, all switches are kept closed and a current flows in the main line. When a switch is opened, the line circuit is broken. By pressing down on the key button, the sending operator completes the main line circuit and a

current flows as long as he holds the key closed, provided the other switches in the main line are kept closed. This current excites the magnets of each *relay*, shown in Figure 3, which magnets pull an armature and thus make a contact that closes the local circuit. A current then flows in the local circuit and excites the magnets of the *sounder*, shown in Figure 4, and these magnets pull an armature quickly against a stop, making a sharp audible blow. This blow, followed by a return blow when the current ceases (by the sending operator ceasing to press his key), and when the armature is drawn back by a spring against another stop, is what the receiving operator listens for.

Each signal, representing a letter or a figure, consists of a combination of long-

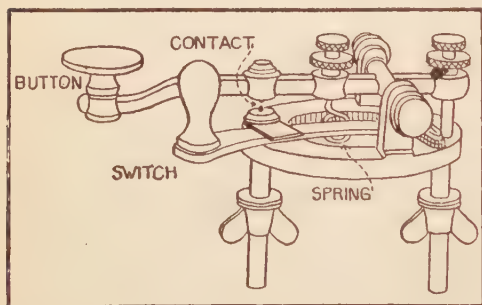


FIGURE 2

and short-current impulses, which are made by the sending operator pressing his key at proper intervals and for a longer or shorter period of time at each contact. These signals are heard by the receiving operator by the blows which the sounder armature makes. When the key is held down for a longer period, the interval between the first blow and the return blow of the armature is longer; this is called a "dash" from the long-line record made on the recording instrument first used in telegraph work. When the key is held down for a shorter period, the interval between the two blows is shorter; this is called a "dot," from the very short-line record made on the old recording instruments. Each

letter, then, consists of dots and dashes, the alphabet which was devised by Morse in 1835 being nearly the same as used today in this country (See MORSE, SAMUEL FINLEY BREES). He arranged

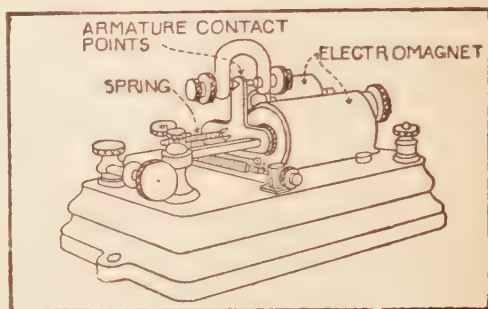


FIGURE 3

that the most-used letters should be made with the fewest dots and dashes.

It is evident from what has preceded that a message sent over a long line can be read at every station on the line at the same time. It is usual for the sending operator to "call" the station he wishes by opening his switch and then sending a certain agreed upon signal repeatedly until the operator at the station desired responds by opening his switch. The sending operator at once closes his own switch and receives a signal indi-

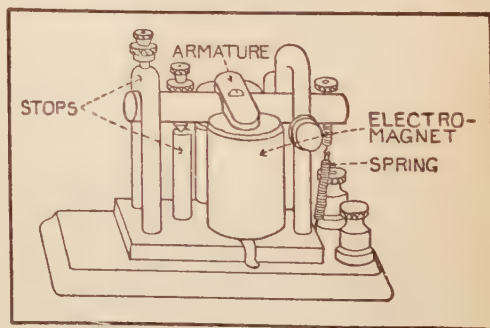


FIGURE 4

cating that the desired station is ready to listen to his message. The receiving operator then closes his switch and the sending operator sends the message as described above.

The main line is usually made of galvanized-iron wire, or better, of copper wire, supported by glass insulators on poles. The circuit is completed by "grounding" each end of the long line, as shown in Figure 1; that is, by connecting each end of the line to a metal plate buried in the ground, where it is fairly moist. Owing to the high electrical resistance of the long-line wire, the current in the main line is feeble. Hence the electromagnets of the relays must be wound with very many turns of fine insulated copper wire in order to enable this feeble current to work the relays. The local circuit, on the other hand, is very short and is made of copper wire, so that its electrical resistance is low. Consequently the local current is relatively strong, and the electromagnets of the sounder are wound with comparatively few turns of fairly coarse insulated copper wire, the strong current in the few turns being sufficient to operate the sounder. For very short lines, sounders wound with a medium number of turns of moderate-sized wire can be used instead of the relays, and the local circuits dispensed with entirely.

MULTIPLE TELEGRAPHY. In order to economize on long and expensive lines, arrangements are made to send two or more messages over the same wire at the same time. When arrangements are made to send two messages simultaneously, one in each direction, the system is said to be *Duplex*. When it is arranged to send two messages simultaneously, both in the same direction, the system is said to be *Diplex*. A *Quadruplex* system is practically a combination of the Duplex and Diplex, enabling four messages to be sent simultaneously, two in each direction. When more than four messages are sent over one wire simultaneously, the system is said to be *Multiplex*. A number of methods for accomplishing this result have been devised and they work successfully. In such cases it is usual to have machine-operated senders and receivers and the system is called *Automatic*, both the mes-

sage sent and that received being recorded on paper strips.

OCEAN TELEGRAPHY. When wires are covered with insulating material and put under water, as are ocean cables, the wire and water separated by the insulating material form an electric condenser of very considerable capacity. This makes necessary a considerable modification in the manner of sending and receiving the signals, as it takes an appreciable time to charge or discharge the cable. Usually some form of D'Arsonval galvanometer with a recording device is used to receive the message, which in this case gives a visual or recorded signal. A key that connects one terminal of a powerful battery to one end of the cable, the other terminal of the battery being grounded, is used as the sending device. The reader who wishes further details should consult D. C. and J. P. Jackson (Macmillan Company), or other more special books on telegraphy. See **ELECTROMAGNET**; **GALVANOMETER**; **TELEGRAPHY AND TELEPHONY**, **RADIO**.

Telegraphy and Telephony, Radio. One of the most wonderful achievements of inventive genius is the transmission of messages through space without the use of connecting wires. Probably the first successful attempt at electric telegraphy between stations not connected by wires was that of Samuel F. B. Morse, who in 1842 sent 16 signals a distance of 80 feet across a canal in Washington, D. C. Today messages are picked up thousands of miles from the place of sending, and "wireless" or radio is a familiar fact of our everyday life. Out of radio telegraphy grew radio telephony, and instead of merely receiving messages by dots and dashes we may hear the voice of a speaker or notes of music across a continent or even across an ocean.

To understand the explanation of radio it is essential to have a thorough mastery of the fundamental principles of electricity (See **ELECTRICITY**). Radio is possible because of a simple interrelation between electricity and the ether which fills the universe, as described in the article on Electricity. Sudden movements of electricity send shocks radiating through the ether, just as blows upon a bowl of jelly would send shocks through it. When these disturbances pass a receiving station, the electrons (or particles of which electricity is composed) bob

up and down in the receiving station, just as corks bob when a water wave passes. This movement of electrons constitutes a current, and by harnessing the current, we can "hear" the passing wave.

Since both radio telegraphy and radio telephony use much the same means to bring about this action, we shall describe the simple telegraphy methods first, and then describe the additions which enable a telegraphy outfit to send or receive spoken messages.

SIMPLE RADIO TRANSMITTING. The simplest radio transmitter is that shown in Fig. 1, facing page 2842. When the key is held down, the induction coil generates alternating current, which causes several hundred sparks a second to cross the spark gap. Each spark sends a disturbance into the ether.

The gap is used because without it the current would simply shoot around the secondary circuit without causing much ether disturbance. The gap acts as a sort of dam, holding the current back until the pressure becomes great enough to burst through the air in the gap. This powerful spurt gives the desired strong shock to the ether.

The antenna and ground serve as the two plates of a giant condenser (See *ELECTRICITY*, subhead *Capacity*), reinforcing the action of the gap. This arrangement is much more powerful than any condenser built of metal.

SIMPLE CRYSTAL RECEIVERS. When ether waves pass a receiving antenna, they cause electrons to bob up and down in the wire connecting the antenna and the ground, as shown in Fig. 2, facing page 2842. This "bobbing" constitutes an exceedingly minute alternating current. In order to make this feeble current yield audible signals, it is necessary, first, to strengthen it, and second, to *rectify* it—that is, to change it from alternating to direct. (This is necessary because the telephone receiver used with radio sets requires direct current.)

The "crystal detector" arrangement, shown in Fig. 2, accomplishes both objects as follows:

The set consists of two circuits, or paths. The first is the path between the antenna and the ground. Inserted in this path is the crystal detector, consisting of a lump usually of silica, attached to the ground connection, and the tip of a fine wire, attached to the antenna, touching the lump. The second path is a complete circuit running through the battery, the telephone receivers, and the detector.

Ordinarily, no current flows in this second circuit, because of the high resistance offered by the slight contact between the fine wire and the crystal. But for some reason not yet known, the current impulses set up by passing waves between the antenna and the ground *reduce* this resistance, and current can flow. Thus the crystal serves as a sort of "switch," turning the battery current on and off, as ether waves pass the station. This gives us the desired strength, because the battery is strong enough to make the receivers emit sound. Since

the battery current is direct, both problems are solved, and the feeble pulses in the antenna are made to give audible signals.

TUNING, PERIOD, and FREQUENCY. Tuning, or adjusting a receiving set to hear one transmitting station and not another, is accomplished by utilizing a property of electric circuits known as *natural vibration period*—a property which depends upon the capacity and inductance of the circuit.

In the transmitter described, for example, no spark came until after the antenna and ground—that is, the condenser—had been "filled to capacity." Obviously, the greater the capacity, the longer such devices will take to "fill." If, for example, a condenser had a capacity such that it took one-thousandth of a second to "fill," we could not send more than 500 alternations a second through it (500 because the condenser would have to be filled to overflowing *each way* for one complete alternation).

We can, therefore, give any circuit whatever period we wish, simply by varying the amount of condenser-action (that is, by varying its "capacity") or by using more or less inductance. For example, we can insert a variable condenser—that is, one having a set of movable plates—in the antenna-ground circuit. If we turn the movable plates so that they interlock with the fixed ones, the capacity of the condenser is at its maximum, and it slows down the natural vibration rate (or lengthens the period of each vibration) in the circuit. As the movable plates are withdrawn, the capacity lessens, the natural period is shortened, and more alternations a second can pass in the circuit. If we like, we may use a *variable inductance* instead of a variable condenser.

With this ability to fix the natural periods of circuits at our command, tuning is easy. Suppose, for example, that we want station A to hear station B, without interference. By prearrangement, each station will adjust the variable condenser (or inductance) in its antenna circuit, so that the two circuits will have the same natural period. Station A then will react perfectly to all vibrations coming through the ether from station B, but imperfectly or not at all to vibrations from stations having different periods.

TUNING TO "WAVE LENGTH." You may wonder why we speak of tuning to "period" when usually people speak of tuning to "wave length." The two terms, however, are interchangeable, for the following reason:

Ether waves travel 186,000 miles, or 300,000 kilometers, every second. If we impart two shocks, a second apart, to the ether, the distance between the two shocks—that is, the "wave length"—will be 186,000 miles, and the frequency, or number of shocks a second, will be one.

If instead of one shock, we give ten a second, at the end of the first second the first disturbance will be 186,000 miles away, and *there* will be ten waves in the ether. Obviously, the

Fig. 1-Transmitter

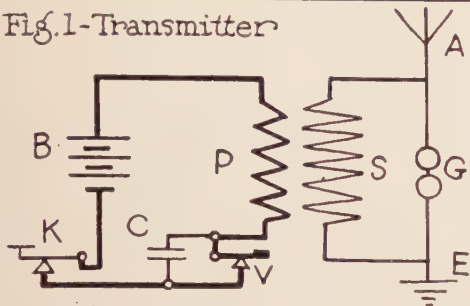


Fig. 1. When the Key (K) is closed, it allows current to flow from the battery (B) through the primary (P) of the induction coil. The vibrator (V) breaks the current several hundred times a second. Each break generates high-voltage alternating current in the secondary (S). These pulses, strengthened by the antenna (A) and the ground (E), break across the spark gap (G). These sparks send disturbances radiating through the ether, much as a blow upon jelly sets it to quivering. The condenser (C) prevents sparking at the vibrator.

Fig. 2-Crystal Receiver

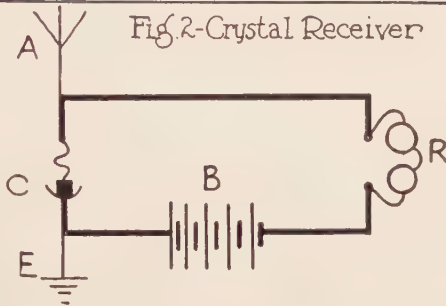


Fig. 2. When an ether wave passes this receiving station, it causes electrons to shift between the antenna (A) and the ground (E)—much as a passing water wave would set corks to bobbing. As explained in the text, the resulting current causes the crystal (C) to permit current to flow from the battery (B) through the crystal and the receivers (R). The receivers buzz as long as ether waves are passing. In order to simplify the explanation, all tuning devices have been omitted from the diagram.

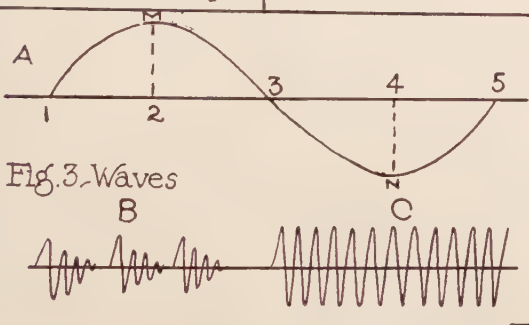


Fig. 3-Waves

Fig. 3. Although ether waves are alternate strains and relaxations, and do not have humps and valleys like water waves, they may be represented diagrammatically by wavy lines, as in Fig. A. Line 1-5 represents the normal state of the ether, with conditions at successive instants shown by vertical lines spaced from left to right. For example: the start of a wave is shown at point 1. Increasing strain is shown by a rising line, attaining maximum at M at a time indicated by point 2. The strain relaxes to normal at time 3, and then relaxation sets in, shown by the wavy line dipping below the normal level. Maximum relaxation is shown at N. The ether then tightens to normal at 5, and is ready for the next "wave." Fig. B shows a train of damped waves plotted according to this system, and Fig. C shows a continuous wave train. The maximum strength of a wave is shown by the lines 2-M and 4-N, and is called the amplitude of the wave.

Fig. 4. This diagram shows how a variable (C) is inserted in an antenna circuit for tuning. Between the condenser and the ground is inserted the switch lever (S) and the inductance L_1 . The lever operates over switch-points 1, 2, 3, and 4. Each point is connected to a segment of the inductance coil L_2 . When the switch lever is in the position shown, current from the antenna must pass through the entire inductance, which thereupon exercises its maximum retarding effect upon the period. Setting the lever upon point 2, 3, or 4 "cuts out" portions of the inductance, thereby shortening the natural period of the circuit. Such an inductance coil is called a **vario-coupler**.

You will notice that in Fig. 4, the battery circuit is not connected directly to the antenna-ground circuit, as in Fig. 3. Instead, it is connected in series with the inductance L_1 . The antenna circuit creates currents in the second circuit by "induction" between the two coils L_1 and L_2 . This arrangement is known as an **inductive coupling**.

Fig. 5. Fig. A shows a simple carrier wave. Fig. B, a voice pulse, and Fig. C, the carrier wave when "modulated," as explained in the text. When this modulated wave strikes a receiving station, the telephone receivers **envelop** the waves, as indicated by the wave-crests, reproducing the voice pulse. This action is explained in the text. In tuning, the receiving station tunes to the frequency of the carrier, which, as you see, retains the same period. The pitch and loudness of the transmitted sounds are brought in by the frequency and amplitude of the modulations.

Fig. 4-Tuning

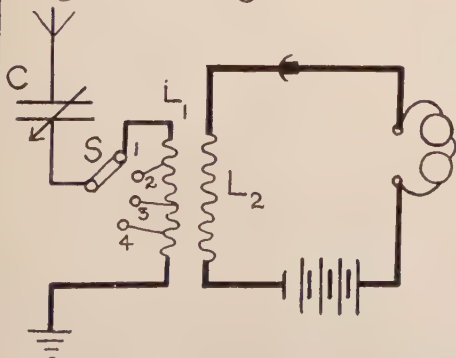


Fig. 5-Carriers and Envelopes

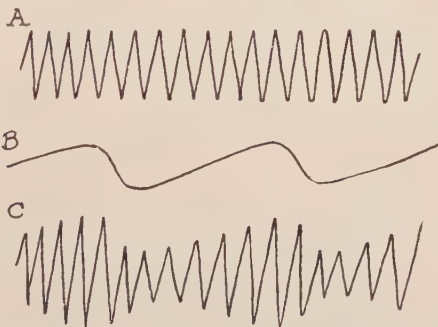


Fig. 6
The Audion

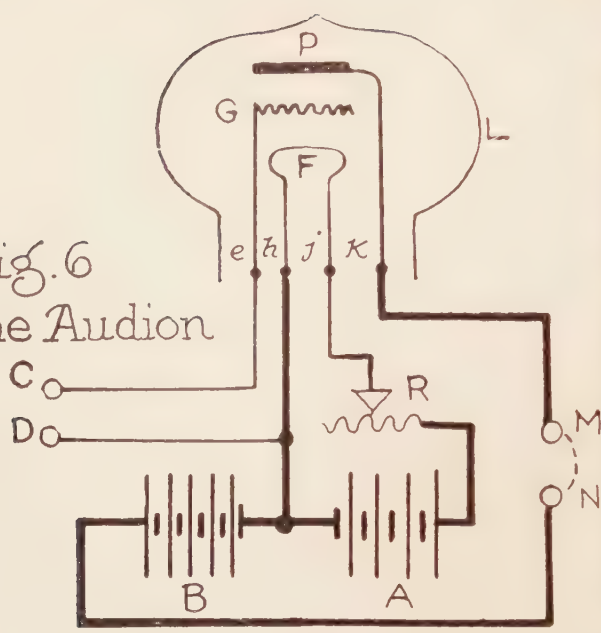


Fig. 6. To start the audion, current is allowed to flow from the heating, or "A" battery (A), through connection (h), the filament (F), the rheostat (R) and back to the battery, heating the filament. The glowing filament "evaporates," or gives off, free negative electrons. The "B" or power battery (B) furnishes negative charge to the plate (P), through connections M and N (where telephone receivers or other devices would be attached). Ordinarily the gap between the filament and the plate prevents current from flowing in this circuit. But when the filament is heated, the freed electrons are drawn to the plate by its positive charge. This constitutes a current, which flows as long as the filament is hot. Meanwhile, attached to points (C) and (D) is some source of feeble current which we wish amplified. Suppose now this source places a feeble negative charge on the grid (G) through connection (e). This charge counteracts part of the positive charge on the plate, and less current flows in the plate, or power, circuit. If the grid charge had been positive, it would have helped the plate charge, and increased the plate current. Thus the power circuit, and any device attached to points M and N, reflects all charges placed on the grid. Further, these power circuit changes are greater than the grid charges causing them, so the audion acts as an amplifier. Lastly, the audion is a rectifier, because the power (plate) current flows one way only. Alternating charges on the grid affect the plate current's strength, but not its direction.

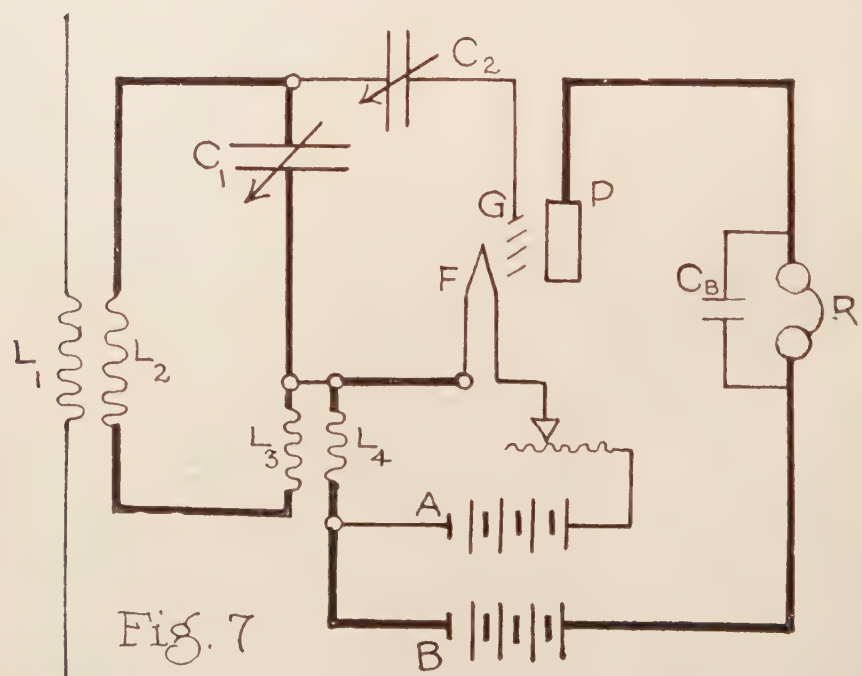


Fig. 7

"Feedback" or "Regenerative" Circuits

Fig. 7. All pulses from the antenna act through inductance L₁ upon inductance L₂, sending alternating current through condenser C₁ and inductance L₃ (the oscillating circuit). This current charges the grid (G) through condenser C₂. Meanwhile the receivers (R) and inductance L₄ are sending current through the plate circuit (shown by heavy wire), including the oscillating circuit. If all vibration rates are properly adjusted, these charges act through condenser C₂ to reinforce the charges already on the grid. That is, the "feed back" from L₄ to L₃ "regenerates," or amplifies, the grid charges, increasing their effect upon the plate circuit. The by-pass condenser C_B permits rapid oscillations to "pass around" the inductance in the receivers. The rates so that the "feed back" pulses arrive on the grid in time to oppose the charges already there. Thus the oscillating and plate circuits "fight each other," and the pulsing current acts by induction to create an alternating current in the antenna circuit. In this case the receivers would be replaced by some transmitting device.

will be spaced 18,600 miles apart. You can see that as the frequency *increases*, the wave length *decreases*. Either, therefore, may be used as a measure of the vibration period. Since the frequencies used in radio vary from 35,000 to over three and a quarter million, with wave lengths varying from five miles in long-distance work down to one hundred yards or less, the wave length was used because the numbers were smaller.

Standard connections for using variable condensers and inductances are shown in Fig. 4, facing page 2842.

DAMPED AND CONTINUOUS WAVES. In addition to strengthening the sparks, the antenna served another useful purpose in the early transmitting sets. To create radio waves successfully, at least 60,000 shocks a second are necessary. But a powerful induction coil will give only several hundred shocks a second, because of its high inductance. Between sparks, however, the antenna and ground interjected oscillatory discharges (See LEYDEN JAR), and these discharges brought the number of shocks up to the required figure.

But each pulse of the oscillating discharge was weaker than its predecessor, as shown in Fig. 3, at the lower left. The resulting waves also were weaker, and the range of the set was diminished, since it would reach only as far as the weak waves would carry.

To overcome this defect, radio engineers devised special dynamos that would generate current with several hundred thousand alternations a second, to replace the induction coil. They also eliminated the spark gap, because the dynamos gave current strong enough to set the ether vibrating. Still later, audion bulbs, as described in Fig. 6, facing page 2843 were substituted for these dynamos.

The waves given by these newer devices were known as "continuous" because they were of uniform strength. The waves from spark sets were called "damped" because successive waves after each spark were weaker.

"BEAT" RECEPTION. Since the pulses of a continuous wave train come at the rate of one hundred thousand a second or more, and the human ear can hear vibrations only up to about 40,000 a second, continuous wave trains will not give audible sounds in receiver phones. This difficulty is overcome by so-called "beat" or "heterodyning" reception, as follows:

When two waves of slightly different frequency come together, they produce pulses called "beats." These "beat" pulses have a frequency equal to the *difference* between the frequencies of the original pulses. For example, if you combine a vibration of 100,000 a second with one of 70,000 a second, you will get 30,000 "beat" pulses a second.

In order to receive continuous waves, we need only turn into the receiving circuit an alternating current with a frequency 30,000 times greater or less than that of the incoming wave train. When no message is coming in, the local cur-

rent, owing to its high vibration rate, is inaudible. But the moment the desired message comes, it sets up "beats," and these are audible in the receivers.

RADIO TELEPHONY. In order to develop radio telephony from telegraphy methods, two improvements were needed. The first was the invention of some means whereby audible sound, with a maximum vibration rate of 40,000 a second, could be made to set up signals not *slower* than 60,000 vibrations a second. The second was the invention of a method for transmitting pitch and loudness correctly.

The invention of beat telegraphy provided a method for doing both, in the so-called "modulated carrier wave."

MODULATED CARRIER WAVES. First look at Fig. 5, facing page 2842, and notice what is meant by the *amplitude* of a wave. When continuous wave telegraphy was developed, inventors hit upon the idea of using a continuous wave, and varying the amplitude as a means of carrying loudness or softness. The idea is explained with the aid of a diagram, in Fig. 5. The continuous wave is known as a *carrier*, and when modified in amplitude, is said to be *modulated*.

This scheme promised to solve both difficulties connected with transforming sounds into ether waves. For example, if the carrier wave has 500,000 pulses a second, and we want to transmit sound of 1,000 pulses a second, we simply impose *one* sound pulse upon each group of 500 carrier pulses. Loudness and softness are transmitted, because as a sound increases in loudness, successive waves of the carrier increase in amplitude.

All that remained, therefore, to make radio telephony an accomplished fact was to devise a satisfactory means for "modulating" the carrier. This was found in the "audion valve," developed about 1911.

THE AUDION VALVE. Since a diagram helps to explain the workings of the audion, you will find the explanation under Fig. 4, opposite page 2842. Because of its amplifying powers, the audion valve offers an ideal means for modulating carrier waves. In modern practice, a minimum of two audions is employed. The voice or music, striking upon a microphone transmitter, causes variations in the strength of an electric current, just as it does in the telephone (See TELEPHONE). The grid and filament of one audion, called the *modulator*, are connected in series with this circuit. The varying charges placed on the grid by the current from the transmitter affect the strength of the "plate current" of the audion. This varying current is led to the grid of a second audion, called the *oscillator*, which has been connected to a modified form of the circuit shown in Fig. 7. As explained beneath the figure, this circuit has the power to make the oscillator generate *alternating* current—and the varying charges upon the grid of the oscillator cause the successive pulses of the current it generates

to vary in amplitude exactly as the current from the microphone varies. These varying pulses are connected to a transformer, which by induction sets up pulses in the antenna circuit, causing it to send modulated waves into the ether.

SIMPLE RADIO RECEIVING. Radio telephone receiving presents no difficulties whatever, the crystal set shown in Fig. 2 being perfectly able to receive the telephone messages as well as telegraph. It can do so because of a curious action known as "enveloping," which takes place in the telephone receivers.

This action may be compared to a boxer striking a punching bag a series of rapid blows. If the blows are of uniform strength, the bag will move to one side as far as the limit of his blows, and remain stationary, because it has no time between blows to spring back. If the boxer gradually increases the strength of his blows, the bag will move outward as though given a single *push*.

Much the same thing happens in the receivers. When the rectified and strengthened pulses caused by a passing carrier wave enter the receivers, the diaphragms spring to a position corresponding to the maximum amplitude of the carrier and remain stationary. If now a modulation causes the carrier waves to increase gradually in amplitude, the diaphragm moves as though a *single* wave, corresponding to the modulation, had come in. In other words, it responds to the *modulations*, and emits them as audible sound.

BULB RECEPTION AND AMPLIFICATION. While the crystal set will receive, as described, it is not satisfactory, because it does not permit easy amplification. For this reason, most sets substitute an audion bulb for the crystal, connecting the antenna to the grid and the ground to the filament. This arrangement causes the feeble antenna pulses to act on the plate current, which amplifies and rectifies them. If further amplification is desired, the plate is connected to the grid of another bulb. The variations placed on the second grid cause stronger variations in the plate current emitted by the second bulb, and the process may be continued by adding more bulbs. Each bulb beyond the first is called a "stage" of amplification. Another method of amplifying is by means of transformers (See TRANSFORMER).

REGENERATIVE RECEIVERS. The amplification described above uses extra bulbs to gain increased power. About 1917, however, Armstrong announced a "regenerative receiver," which strengthened incoming pulses without extra bulbs. This receiver utilized the circuit described in Fig. 7, facing page 2843, to obtain its effect.

NEUTRODYNE RECEIVERS. This type of receiver was invented as a means of overcoming a trouble known as "bulb capacity." Bulb capacity is easily explained as follows: The grid and plate of an audion bulb, as we might expect, act as opposite plates of a tiny con-

denser. This action often causes trouble by affecting the period of the circuits used, hampering their proper action, and some times setting up local oscillations. The neutrodyne circuit eliminates these difficulties, giving purer tone, as follows:

The "cascade," or chain of bulbs, is connected by radio transformers instead of being connected directly. Then a small condenser is attached between the grid of each bulb (except the last) and the transformer which is passing on the plate current to the next bulb. The connection is made in such a way that the condenser charge neutralizes that arising between the grid and the plate, thus eliminating "bulb capacity."

SUPERHETERODYNE RECEIVERS. These circuits are ingenious adaptations of the heterodyning idea used in radio telegraphy. We can best see how a superheterodyne works by supposing that we want to hear a message coming in with a frequency of 600,000 a second (the wave length would be 500 meters). The incoming impulses are fed to a detector bulb in the usual way, but the bulb is also supplied with impulses of, say, 570,000 frequency by an oscillator tube in the set. The two sets of impulses combine to produce "beats" with a frequency of 30,000 a second. The rest of the set, which is designed to react only to impulses with this frequency, "steps up" these beat pulses to the desired audibility. Tuning is accomplished by setting the oscillator tube to deliver pulses 30,000 a second slower or faster than the pulses of the incoming wave we want to hear. Since this can be done with extreme accuracy, and the amplifying portion of the set will act only when given beat pulses of the proper frequency, exceedingly sharp tuning can be attained.

BROADCASTING. Broadcasting by radio has become not only a fascinating pastime, but almost a necessity and an essential part of the economic, political, and social life of the United States and Canada. The growth of broadcasting stations in the United States was so rapid that in 1924 it became necessary for the Department of Commerce systematically to license them and allot wave lengths and time schedules in order to prevent annoying confusion. Important market, agricultural, and financial news is sent out, as well as sporting news, university lectures, church services, and music of all kinds, and this service is free to any possessor of a receiving set. The radio repeating station, whereby programs are relayed, was a development of 1923.

INVENTION OF RADIO. Radio got its start when in 1865 Clerk Maxwell, in England, announced his idea that a sudden movement of electricity would send disturbances radiating throughout the ether, just as a sudden blow upon still water sends waves radiating over it. Heinrich Hertz, a young German scientist, became interested and decided to submit Maxwell's ideas to a practical test.

To do this, he devised a transmitting appar-

atus similar to that shown in Fig. 1, except that it lacked antenna and ground connections. In 1886, with a crude detector, he detected signals sent from one room to another, this being the first "radio" message ever sent. Radio waves are called "Hertzian waves" in honor of the man who discovered them.

MARCONI'S WORK. Marconi's notable contribution was his invention of the antennae and ground connections, as shown in Fig. 2. When his early demonstrations proved his ideas practical, he devised powerful apparatus, and on Dec. 12, 1901, succeeded in signaling across the Atlantic, from Poldhu, Cornwall, to St. John's, Newfoundland. This triumph established radio firmly and a host of inventions have aided in bringing it to its present form.

Telephone, Tel' e fone, the name given to the apparatus by which articulate speech is transmitted to a distance

electrical resistance of this circuit is decreased and the current flowing increases in strength; and as the pressure is decreased, the resistance increases and the current flowing decreases in strength. This varying direct current in the primary, P, induces an alternating current in the secondary, S, of the induction coil, and it is this alternating (or "talking") current that passes over the line and operates the receivers at both stations.

The *receiver* consists of a permanent horseshoe magnet with an iron diaphragm held near the two poles. Coils of fine insulated wire wound round the ends of the two poles are connected

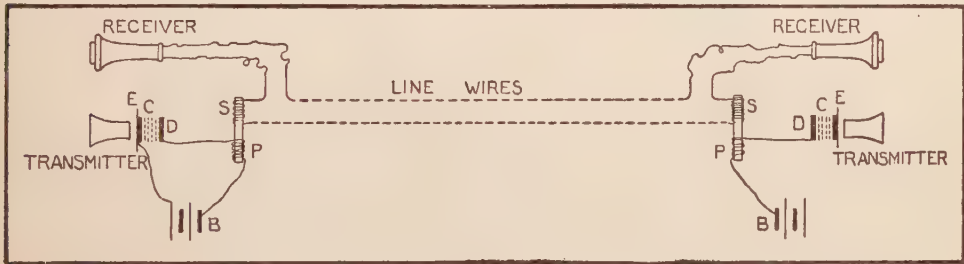


FIGURE 1

by means of electricity or by other means.

The essential elements of a simple electric telephone system connecting two stations are: the transmitter, the receiver, the induction coil, the signaling apparatus, the line and the battery. The general arrangement, except the signaling apparatus, is shown in Figure 1. In this system local batteries are used. The operation is as follows: When one talks into the transmitter, the sound waves in the air strike the diaphragm, E, and cause it to vibrate back and forth. This vibration alternately increases and decreases the pressure on some carbon granules, C, immediately behind the diaphragm between it and the solid back of the transmitter; these granules are in circuit with the battery, B, and the primary, P, of the induction coil. As the pressure is increased, the

in the line and carry the "talking" current mentioned above. This current, as it alternates in direction and varies in strength, strengthens and weakens the poles of the permanent magnet to a greater or less extent, and thus causes them to pull the diaphragm more or less strongly. Hence the diaphragm is made to vibrate approximately in unison with the transmitter diaphragm and so sets up sound waves in the air that correspond to those striking the transmitter diaphragm. By holding the receiver fairly close to the ear, one can hear the words very nearly as the speaker at the other station uttered them. Diagrams of the common transmitter and receiver are shown separately in figures 2 and 3.

The general arrangement of circuits for one subscriber and the central station is shown in Figure 4. In this system all local batteries are dispensed with,

and one large storage battery of 24 volts is used, connected both as B and B' in the diagram. The operation of a subscriber calling central and securing connection with another subscriber is as

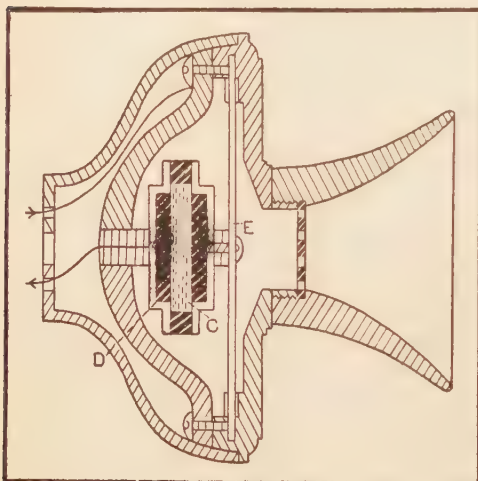


FIGURE 2

follows: A subscriber calls central by lifting his receiver, R, from the hook, H, thus closing the main line at T, so that a current from the main battery, B, flows through his transmitter, T. This current also excites the electromagnet, G, which closes the contact, R, thereby causing the signal lamp to light up by current from the battery, B. The signal lamp is on the switchboard in front of the central operator, and when it lights up, the central operator inserts an answering plug, P, into the subscriber's "jack," J. By next closing the listening key, she puts her own transmitter and receiver into connection with the calling subscriber and ascertains the number with which he wishes to be connected. When the plug, P, is inserted into the jack, J, it opens the contacts at O and thus opens the circuits of the battery, B, through the electromagnet and the lamp, thereby extinguishing the signal lamp.

Having ascertained the number desired, the central operator inserts the calling plug, P', into the jack of the desired number and pushes for a moment

the ringing key. It will be seen from the diagram that this connects the ringing magneto, M, to the circuit of the subscriber being called, by closing the contacts. When the subscriber called answers, he finds himself in connection with the subscriber calling, and the two subscribers converse just as in the more simple arrangement first described. The central operator usually releases the listening key as soon as she ascertains the number desired. When one of the subscribers "hangs up," another signal lamp (not shown in the diagram) is lighted, and the two plugs, P and P', are withdrawn by the central operator.

It will be noticed from the diagram below that in the central-energy arrangement, direct current from the battery, B, passes over the line and through the transmitter and the primary, P, of the induction coil, at the same time that the alternating, or "talking," current from the secondary, S, of the induction coil passes over the line. Both theory and practice show, however, that speech is transmitted in this manner just as well as by the more simple arrangement of Figure 1. The alternating, or talking, current flows over the line by charging

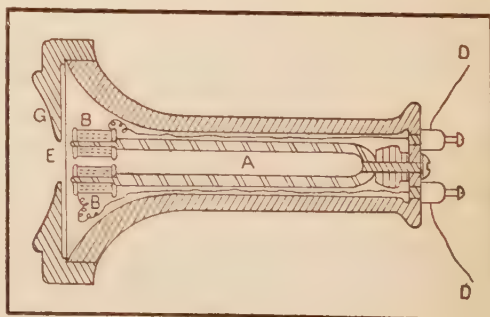


FIGURE 3

the condenser, C, first one way and then the other. The ringing current, which is also an alternating one, flows over the line by alternately charging the condenser, C, first one way and then the other. In neither of these last two instances could a direct current be made to flow over the same path.



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SENDING PICTURE BY TELEPHOTOGRAPHY

Telephotography. The transmission and reception of stationary pictures by wire or radio is generally spoken of as telephotography. The principle employed is the instantaneously light-sensitive or "photo-electric" cell and its property of allowing heavier currents of electricity to pass through it when light strikes its components, and proportionally smaller currents to pass through it as less light and finally darkness strikes it.

At the transmitting end, a picture is placed upon a revolving drum. A beam of light is made to play upon this drum at a given point as it revolves. After making one revolution, the beam of light is moved a hairbreadth and the cylinder is again revolved, repeating this operation until the whole surface of the picture has been covered. A mirror reflects the partial image, or reflected light, onto the photo-electric cell, which is enclosed except for a small aperture left open to receive this reflected beam. A current of electricity flows through the cell increasing or diminishing with the intensity of the light spotted.

In wire transmission this current, after being strengthened or amplified,

is sent by telephone wires from New York to Chicago, or San Francisco to New York. At the receiving end, if more than one reproduction of the photograph is desired, the current is used to throw a beam of light on a sensitized photographic film, mounted on a cylinder and revolving at exactly the same speed as the original photograph at the sending end of the wire. The result is a negative from which any number of duplicates may be printed photographically. If but a single reproduction is wanted, the receiving set is equipped with a neon tube, permitting the use of sensitized paper on the revolving cylinder. This paper is then developed to bring out the image.

In radio transmission, instead of sending the current from the photo-electric cell over wires, it goes to a continuous wave radio transmitter. Here the current "modulates" or squeezes together this "continuous" or "carrier" wave in exact proportion to the amounts of light striking the photo-electric cell. At the receiving end this modulated wave is converted back into a fluctuating electric current, and from this point on the process is the same as in the wire televiser.



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APPARATUS USED IN TELEVISION TRANSMISSION

Television. The systems employed both by radio and by wire closely resemble one another. The process begins when the sitter takes his position in front of the television apparatus. Immediately before him is a screen on which are four large photo-electric cells. In the center of the screen is a square hole. Just back of this is a perforated revolving disk, through which the rays of an arc lamp pass, illuminating the face of the sitter. The disk has a series of 48 holes, each about the size of a pencil lead in diameter, arranged in a spiral. The light reaches the face of the subject through these holes only, and the disk spins at the speed of 18 revolutions per second. Thus a moving pencil of light covers the entire field of vision of the apparatus that many times per second, and the subject to be transmitted is "painted" or "scanned" by this pencil of light.

The lines, contours, and colors of the face cause variations in the intensity of the spots of light they reflect. The reflected light is picked up by the sensitive photo-electric cells, which permit a strong current to pass when the reflection is strong, and a weak current

to pass when the reflection is dim. This "picture current" fluctuates at an enormous rate of speed. It is amplified and sent by wire to the receiving station, or the current is used to modulate the radio transmitter, in a manner very similar to that in which the voice is broadcast.

At the receiving end is a standard vacuum-tube amplifier connected to a special type of neon tube which can vary its brilliancy one million times per second, in accord with the picture current. Between this tube and the screen on which the radio picture is thrown, is a 24-inch metal disk, a duplicate of the one at the sending end, spinning at the same rate of 18 revolutions per second. Just as the pencil of light scanned the face of the subject sitting before the transmitter, another pencil of light scans the receiving screen, producing a life-like radio moving picture of the sitter.

The disks at both ends are run with small universal motors of fairly constant speed, and arrangements are made at the receiving end to vary the speed of the motor slightly until a clear picture is produced.

WIRELESS TELEPHONE. It is found that the ether waves usable in wireless telegraphy are as readily controlled in telephony. The wireless telephone transmits the waves into the air by a series of antennæ similar to those used by the wireless telegraph. The receiving appa-

so far as practical use is concerned, Galileo should probably have the credit. The first instruments were crude and were made in Holland about 1608. All kinds of telescopes have the long tube in common, and are of two kinds, *reflectors* and *refractors*. The first instru-

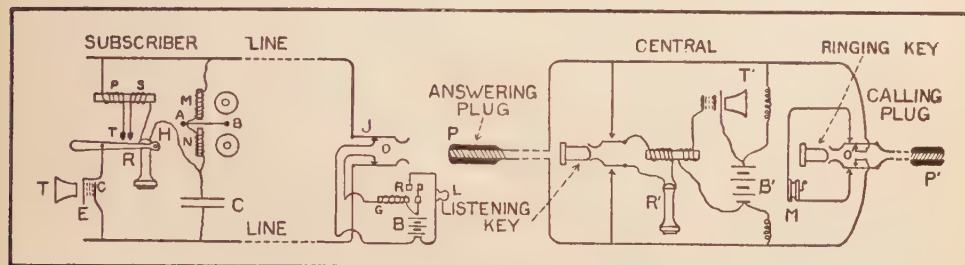
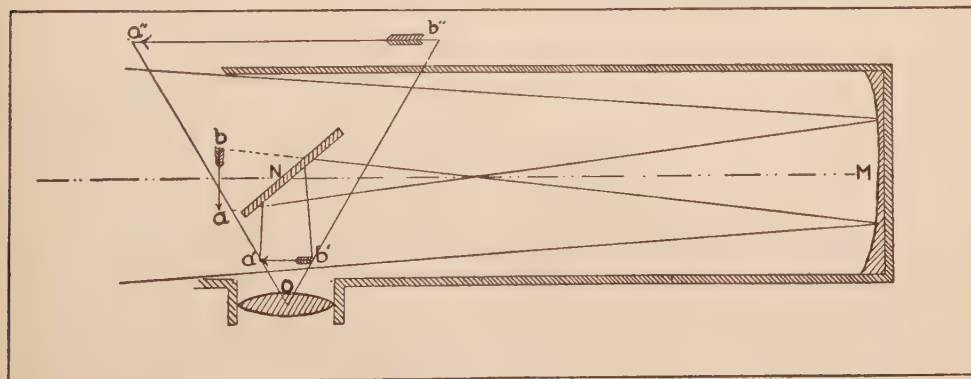


FIGURE 4

ratus is much more delicate than that in the telephone, and makes use of the instruments described in the article TELEGRAPHY AND TELEPHONY, RADIO.

For a more detailed description of telephone apparatus and connections, the reader should consult special works on the telephone. See ELECTROMAGNET; INDUCTION COIL; ELECTRICITY.

ments were reflectors. The reflecting telescope is shown in the diagram. M is the mirror of speculum metal, which would form an image of a distant object at a b; N is the small plane mirror which changes the position of the real image from a b to a' b', and O is the ocular producing a magnified virtual image of a' b' at a'' b''. There are numerous variations



REFLECTING TELESCOPE

Telephone Receiver. See TELEPHONE.

Telephone Transmitter. See TELEPHONE.

Tel'escope, an instrument for viewing distant objects. The telescope has been accredited to various persons; but

in particular arrangements of this kind of telescope. The eyepiece usually must be reached by means of a platform or gallery. Lord Rosse's telescope at Birr Castle, Ireland, is a reflector.

The refracting telescope has a double-convex lens called the object glass at

the upper end of the tube, and another smaller lens, the eyepiece, at the lower end below the focal point. This eyepiece magnifies the image produced by the object glass so that it can be distinctly seen. The Lick and Yerkes telescopes are refractors, which is the kind generally preferred at this time. The object of the telescope is twofold: to gather more rays of light from the star than can enter the small pupil of the eye, condense them at the focus and then return them to parallelism so condensed that they can all enter the eye; and to magnify the star.

Modern astronomical telescopes are usually connected with clockwork that automatically changes the position of the telescope to correspond with the changing position of the heavenly body under observation. They are also provided with spectroscopes and cameras. Telescopes for viewing objects on land contain a third lens placed between the object glass and the eyepiece, at such a point as will enable it again to invert the inverted image formed by the object glass. Without this lens terrestrial objects seen through a telescope would appear inverted, as on the screen of a camera. See ASTROPHOTOGRAPHY; ASTRONOMY; LICK OBSERVATORY; YERKES OBSERVATORY.

Tell, William, a Swiss peasant of Bürglen, the hero of a legend connected with the struggles of the Swiss against Austrian tyranny. The story is that Gessler, the tyrannical Austrian bailiff of Uri, made a rule that the Swiss should bare their heads before his hat. Tell, who refused to perform this act of homage, was condemned to shoot an apple from his son's head. This feat was successfully accomplished, but when Gessler discovered that a second arrow in the possession of Tell was intended for his own death in case the first arrow killed the boy, he kept Tell a prisoner. As the tyrant was crossing the Lake of Lucerne with his captive, a violent storm arose and Tell was freed from his chains that he might help steer the boat.

Guiding the vessel near the shore, he sprang on a rock and made his escape. Gessler himself finally reached safety only to meet death from the well-aimed arrow of his former prisoner. The death of the tyrant was followed by a desperate war between the Swiss and the Austrians, which ended in 1499. Tell is supposed to have lost his life in 1350, while attempting to save the life of a friend, during a flood. The story of the apple occurs in the literature of Denmark and Iceland, and historians now consider the tale to be purely mythical. The legend has been fittingly treated by the dramatist Schiller in his great play *Wilhelm Tell*.

Tellurium, a silvery crystalline metal discovered in 1782 by Reichenstein. It is rarely found free but generally in connection with gold, lead, silver or bismuth. Pure tellurium is rather brittle and has a brilliant luster. Our chief sources of tellurium are Colorado, California and Brazil.

Tem'perance, Sons of, a society for the promotion of temperance, organized in New York in 1842. Its membership consists of men and women, as well as boys who are 16 years of age. Members sign a pledge to abstain from alcoholic drinks and to discourage the sale or manufacture of the same. They number about 3,000,000 in the United States.

Tem'perature. See HEAT.

Tem'pering, the process of giving to metals the requisite degree of hardness. While the process is applicable to a number of metals, in the ordinary use of the term tempering is applied to iron and steel. The degree of hardness required is that necessary to enable the tool or other article to do its work. When iron and steel are raised to the highest possible temperature without melting, and are allowed to cool, naturally, they become as soft as it is possible to make them. If raised to this temperature and cooled as quickly as possible, they reach the highest degree of hardness. Between these extremes prac-

tically any degree of hardness required may be obtained.

Tools required for cutting other metals are made harder than those used in cutting wood, but in each of these classes of tools there are various gradations. Steel saws and chisels hard enough to cut steel are in constant use among iron and steel workmen. The blade of a razor is of a different degree of hardness than the blade of an ordinary knife. These various degrees of hardness are obtained by heating to the required temperature and cooling in a given way. In ordinary tempering, water is used for cooling, rain water being the most desirable because it is free from impurities. In tempering tools various compositions are used, such as oils, molten lead, salt water and mixtures containing several ingredients. These mixtures are usually trade secrets, and their composition is not easily obtained. For some purposes the steel is heated and cooled quickly, then heated slowly until it reaches the required degree of hardness. As various steels and sometimes even the same steel in different forms require different heat treatments, no rule can be given for the exact temperature in all cases, and experience is the only safe guide. Steel indicates by its color only approximately the degree of heat to which it has been subjected.

In factories where a large duplication of products is made, like friction balls for bearings, small gear wheels, cams, springs, milling cutters and similar articles, furnaces employing gas or oil, with pyrometers to indicate the exact heat, are used so that the reheating is not required, as the articles are sufficiently tempered after one heating and quenching. Some of the more recent alloyed tool steels used on turning lathes for boring and turning shafts, etc., are what is known as air-tempered, and get harder by the heat caused by cutting cast iron or steel, while in ordinary steels the temper is lost or drawn out by this heating. See ANNEALING.

Tem'plars, Knights, a military and religious order founded in Jerusalem in 1119. The order received its name from being assigned quarters in what was a part of Solomon's Temple. The chief purpose of the order was to defend the Christian faith and the Holy Sepulcher. The order grew rapidly and was for a time under the direction of the Pope. The capital was at Jerusalem until 1187. After this date it was at several places until 1291, when it was located in Cyprus. The Templars became the bankers of Europe and exerted strong political influence as well. Their success, combined with their secret rites, however, aroused serious opposition and finally the organization was abolished by order of the Pope in 1312. Later the order was revived in the Free Masons and now constitutes one of the highest orders within that fraternity. It has about 200,000 members in the United States.

Tem'ple, Tex., an agricultural center and manufacturing city of Bell County, 35 miles southwest of Waco, on the Gulf, Colorado & Santa Fe and the Missouri, Kansas & Texas railroads. An electric railway connects the city with Belton, the county seat, 10 miles distant. It has a commercial airport. Temple is situated in a productive agricultural region and is a shipping point for cotton, oats, corn, and live stock. Among the leading industrial establishments are a cottonseed oil mill, cotton gins and presses, flour mills, and manufacturing of desks, gum, and candy. The city was founded in 1881 by the Gulf, Colorado & Santa Fe Railroad, which maintains large car shops here. It was chartered as a city in 1884, and has the city-manager form of government. Population, 11,100.

Temple, The, a magnificent house of worship built by Solomon, on Mt. Moriah, in Jerusalem. It was an oblong building, 90 ft. long, 30 ft. wide and 45 ft. high. The front side, which faced the east, was open, and was ornamented by a porch 15 ft. deep, supported by two

brazen pillars, 18 ft. in circumference. On the other three sides there were corridors, rising above each other in three successive stories, to a height of about 27 ft. The walls were built of stone, lined with cedar brought from Lebanon, and the floors and ceiling were laid with cypress. The interior was entirely overlaid with gold. Within the Temple was a most holy place, called the Holy of Holies, in which was placed the Ark of the Covenant (See **ARK OF THE COVENANT**). The Holy of Holies was separated by a curtain from the sanctuary, or Holy Place, in which were placed the golden candlesticks, the table of the shewbread and the altar of incense. About the Temple ran an inner court, containing the altar of burnt offering, and separated from the outer court by colonnades with brazen gates. The building was four years in process of construction and the expense of the enterprise was very great. The brass or bronze articles were manufactured under the direction of Hiram, a skilled workman of Tyre, and the King of Tyre furnished the timber used.

The Temple of Solomon was destroyed in 586 B. C., when Nebuchadnezzar captured the city and carried away the Jews into captivity. A second Temple, inferior in splendor, was erected after the return of the Jews from the captivity. Herod the Great rebuilt it on a more magnificent scale, but this structure was destroyed by the Romans in 70 A. D. On its site there now stands the Turkish house of worship, the Mosque of Omar, erected by one of the early caliphs.

Tenacity, *Te nas' i ty*, in physics, the resistance to rupture. It refers especially to the greatest lengthwise stress that a body can bear without being torn apart. It is generally measured with reference to the number of pounds per square inch necessary to produce the rupture. Tenacity may refer to any of a number of forms of resistance, as: tensile strength, when reference is to its resistance to fracture by stretching;

crushing strength, resistance to crushing; torsional strength, resistance to twisting, etc. Where it is possible to do so, tensile strength is determined in a substance by making it into a cylinder or wire and finding the weight necessary to pull it apart. Tenacity varies with the temperature of the body, the direction in which the force for tearing is applied and several other conditions. The relative tenacities of some common metals are as follows: lead, 1; tin, 1.3; aluminum, 10; cast iron, 7 to 12; wrought iron, 20 to 40; steel, 40 to 100. See **ELECTRICITY**.

Ten'ant, in law the occupant or temporary possessor of lands or buildings whose titles are in possession of another party called the landlord. The terms of occupancy are usually stated in the lease. A tenant at will is one who does not occupy the property for any specified time and must remove at any time on request of the landlord. A tenant in common holds the property with others. Owing to the nature of the land system in England the laws pertaining to landlord and tenant are much more complete than in this country. See **LEASE**.

Ten'der, Legal, in law an offer of compensation in a money action. The money must be actually produced if the tender is to be held valid. The tender of money for any payment is everywhere called a *legal tender*, if the money offered is current coin of the country; hence, the kind of currency authorized by law to be tendered is itself called *legal tender*. In the United States, silver coins of less than one dollar are legal tender only in payment of accounts not exceeding \$10; nickels and cents only to the extent of 25 cents; but silver dollars and gold coins may be tendered in any amount. Tenders made by United States notes are legal for all purposes except for customs and for interest on the public debt; while United States treasury notes are legal tender for all purposes whatsoever. Gold certificates, silver certificates and national

bank notes are not legal tender. See MONEY, subhead *Paper Money*.

Ten'don, a term employed in anatomy to designate the strong, white fibrous tissue which serves to attach muscles to bones. Some tendons are cylindrical, others broad ribbons or thin sheets. All are inelastic. Thin tendinous expansions sometimes serve to strengthen the walls of cavities; as, for example, the tendons of the abdominal cavity. The tendon of Achilles is an important tendon in the heel. See LIGAMENT.

Teneriffe, *Ten er if'*, the largest of the Canary Islands, lying about 600 m. s.w. of the city of Morocco and interesting as having the highest known peak rising from the Atlantic Ocean. The island is of volcanic formation, and consists of a great mass of rock which rises at the center of the island to the great Peak of Teneriffe, 12,200 ft. above the sea. The coast is rugged and offers few points of entrance satisfactory as harbors. Upon these cliffs, however, are great groves of bananas, oranges, lemons, figs, peaches and chestnuts; still above these lie forests of oak, pine and laurel, while at a still higher elevation the barren snow-covered crater peaks overlook the sea. Cereals, tropical fruits, nuts, honey, wax, silk, sugar, wine, coarse linen and woolen goods, lace and furniture are exported. The chief city is Santa Cruz, and the population of the island, consisting chiefly of people of mixed Spanish extraction, numbers about 138,000.

Teniers, *Ten' yers*, **David**, the Younger (1610-1690), the principal painter of common life of the Flemish School, born at Antwerp. His genius developed early, and at the age of 23 he entered the Painters' Guild as a master. His maturer work was influenced by Rubens, whose ward he had married. Teniers was a prolific worker and left about 800 paintings. They exhibit a remarkably keen observation of nature and beautiful color harmony. His unique monkey pictures, *Monkeys in a*

Tavern Smoking, The Monkey Concert and Repast in the Kitchen are delightful burlesque. The artist's most characteristic works are rural scenes of everyday life, notably *Interior of Village Inn, Peasants' Dance and Hour of Rest*.

Tennessee, *Ten' e se'*, THE BIG BEND STATE, one of the East South Central States, is bounded on the n. by Kentucky and Virginia, on the e. by North Carolina, on the s. by Georgia, Alabama and Mississippi, and on the w. by Arkansas and Missouri, from which it is separated by the Mississippi River.

SIZE. The breadth from east to west is 432 m. The length is 109 m. and the area is 42,022 sq. m., of which 335 sq. m. are water. Tennessee is almost the exact size of Virginia, a little larger than Kentucky or Ohio, a little smaller than Pennsylvania and about one-half the size of Minnesota. It is the 34th state in area.

POPULATION. In 1920 the population was 2,337,885. From 1910 to 1920 there was a gain in population of 153,096, or 7 per cent. There are 56.1 inhabitants to the square mile and the state's rank in population is 19.

SURFACE. The Unakas, or Great Smoky Mountains, cover the eastern border of the state. They rise in great masses and have a number of peaks over 6000 ft. high, the highest, Mt. Guyot, being 6636 ft. West of these mountains is the Valley of East Tennessee, lying between the Unakas on the east and the Cumberland Plateau on the west and occupied by the Tennessee River. The valley contains a series of minor ridges and valleys which give it a pleasing appearance. From this valley the Cumberland Plateau rises abruptly 1000 ft., attaining an altitude of 2000 ft. above the sea. The eastern edge is a continuous rocky cliff, but the western border is irregular and broken. This plateau region has an area of over 5100 sq. m.

Between the Cumberland Plateau and the Tennessee River is the highland region, having an average elevation of

about 900 ft. and an area of over 9000 sq. m. The region is mostly a level plain containing a number of ravines and streams. In the central part of the highlands is a remarkable depression known as the Central Basin. This resembles the bed of an ancient lake and has an area of over 5400 sq. m. It contains the best farm land in the state. West of the highland region is the Valley of the Tennessee, which stretches across the state from north to south, and has an average breadth of 12 m. The surface is irregular. West of this valley is the Plateau of West Tennessee, which is a plain sloping toward the west and meeting the bottom lands of the Mississippi. This forms a low, flat plain heavily wooded in places.

RIVERS. The Tennessee River is the most important stream within the state. It drains the Valley of East Tennessee, then crosses into Alabama to reenter the state and cross it from south to north, emptying into the Ohio at Paducah, Ky. The Cumberland drains the north-central part of the state, and is of great economic importance. The western part is drained into the Mississippi by short streams. Both the Tennessee and Cumberland have a number of small tributaries lying wholly or partially within the state.

SCENERY. Among the mountains along the eastern border are numerous delightful coves and beautiful valleys. This region presents a combination of beauty and grandeur that makes the scenery particularly attractive. The Valley of East Tennessee is also noted for its beauty. The region about Chattanooga, including Lookout Mountain, is widely known for its beauty as well as for its historical associations. The center of the state and the Valley of West Tennessee present pleasing landscapes dotted with fertile farms.

CLIMATE. The variation in altitude between the east and west boundaries gives the state a wide range in climate. Along the Mississippi the climate is mild temperate, while in the mountains along

the eastern border it is cool temperate with a mean temperature about the same as that of Vermont and New Hampshire. However, the winters are more mild and the summers cooler than in the New England States. This region is attractive both as a summer and a winter resort. The climate in the central part of the state is a mean between that of the eastern part and that of the western. The average annual rainfall of the state is about 50 inches, quite evenly distributed throughout the year. In the northern half of the state and among the mountains snow falls but does not remain long. Ice is also formed in this part of the state.

MINERALS AND MINING. There are bituminous coal fields in the Cumberland table-land having an area of over 5000 sq. m. A number of coal mines are in operation. The annual output amounts to about 6,500,000 tons. Iron ore is found in the Unaka Mountains around Chattanooga and in the hills along both sides of the Tennessee River. Considerable ore is mined and smelted. There are extensive deposits of phosphate rock in Maury, Hickman, Lewis, Sumner and adjoining counties. This rock is quarried in several places. Zinc ore occurs in Jefferson, Union and Claiborne counties. Fluorspar is mined in Wilson, Trousdale and Smith counties. Cement rock is quarried in Decatur, Hardin and Wayne counties. Roofing slate is found at the foot of the Unaka Mountains, and marble of excellent quality for building purposes is generally distributed throughout the Valley of East Tennessee. This marble is extensively quarried. Clay is widely distributed over the state, and kaolin occurs in Henry and Carter counties.

FORESTS AND LUMBER. Large pine forests are found on the Cumberland Plateau. The bottom lands are heavily timbered in sections, and there are large forests of hard wood, including oak, ash, black walnut, maple, beech and other varieties of trees, in the mountainous regions, on the uplands and in

other parts of the state. Lumbering and the manufacture of lumber products are important industries.

AGRICULTURE. Agriculture is the most important industry of the state and furnishes occupation for about 60 per cent of the inhabitants. The average size of the farms is about 91 acres, and more than one-half of them are tilled by their owners.

Soil. Tennessee has a great variety of soil, adapting it as a whole to a great variety of products. The soil of the bottom lands is alluvial. Limestone and granite soils are found in the central part of the state, and in West Tennessee the soil is a mixture of lime and alluvium and of a high degree of fertility.

Products. The leading field crops are corn, wheat, cotton, tobacco, oats, hay, sorghum and peanuts. Fruits of all kinds suited to a temperate climate are raised and large quantities of peaches, pears and strawberries are sent to Northern markets. In the eastern part of the state tomatoes, asparagus and garden vegetables are grown in large quantities. Most of the cotton is raised in the western counties. Raising live stock is an important branch of agriculture and the state is noted for its excellent horses and mules, and for the high grade of the wool produced. Some of the highest grade of short-horn cattle in the country are found in middle Tennessee. Dairying is also of considerable importance.

MANUFACTURES. Lumbering and the manufacture of such agricultural implements as are made from wood and other lumber products constitute the leading manufacturing industries. Next in importance is the manufacture of pig iron and iron and steel products. Then follow in their order the manufacture of textiles, of prepared foods, of leather, of chemicals and fertilizers, of paper, of clay and stone products, of glass and of tobacco. Gristmills are found in all parts of the state and the manufacture of flour and other gristmill products is an important industry.

The manufacturing industries of Tennessee are rapidly increasing in variety, value and extent.

TRANSPORTATION AND COMMERCE. The navigable rivers include the Mississippi, the Tennessee for 320 m., the Cumberland for 315 m., and a number of smaller streams which are navigable in their lower courses for light boats, and admit the rafting of lumber and logs. The state has about 4000 m. of railway. The leading systems are the Illinois Central, the Louisville & Nashville, the Nashville, Chattanooga & St. Louis, the Tennessee Central, the Mobile & Ohio, and the Southern. Memphis, Nashville, Chattanooga, Knoxville and Clarksville have electric lines connecting them with their suburbs. These cities are also the chief railway centers. As a whole the transportation facilities of the state are good.

Cotton, wool, tobacco, fruits, vegetables, live stock, iron and steel products and lumber and lumber products are exported. Manufactured goods and food-stuffs are imported. Memphis, Nashville, Knoxville and Chattanooga are the chief commercial centers.

GOVERNMENT. The present constitution was adopted in 1870. The executive department consists of the governor, elected by the people for two years; a secretary of state, elected by the Legislature for four years; a treasurer and comptroller of the treasury, elected by the Legislature for two years; and an attorney-general, appointed by the judges of the Supreme Court for eight years. The superintendent of public instruction and commissioner of agriculture are appointed by the governor and confirmed by the Senate for two years. The chief state boards are the board of railway commissioners, board of prison commissioners and board of pensions. The Legislature consists of the Senate and House of Representatives. The number of representatives is limited to 99 and the number of senators cannot exceed one-third of the number of representatives. Both the senators and representa-

tives are elected for two years. The Legislature holds biennial sessions which are limited to 75 days.

The judicial department consists of a Supreme Court of five judges, a Court of Civil Appeals of five judges, all elected by popular vote for eight years, Circuit Courts and other inferior courts. The judges of these courts are elected by the people of their respective districts for eight years.

EDUCATION. The school system is in charge of a superintendent of public instruction. In the last few years the schools have made rapid progress. Revenue is derived from interest on the permanent school fund, state appropriations, county taxes and, in some cities and towns, local taxes. The state appropriates one-fourth of its revenue to educational purposes. This fund is reapportioned to the elementary schools, the county high schools, the four state normal schools, the state university and the state libraries. In cities and larger towns the schools are well graded. Separate schools for white and colored children are provided throughout the state. The University of Tennessee, including the agricultural college, is at Knoxville. The higher educational institutions not under control of the state are the George Peabody College for Teachers and Vanderbilt University at Nashville; University of the South at Sewanee; University of Chattanooga at Chattanooga; and Fisk University at Nashville, a school for colored students.

STATE INSTITUTIONS. The hospitals for the insane are at Bolivar, Nashville and Knoxville. The school for the deaf and dumb is at Knoxville, the school for the blind and the state industrial school are at Nashville. The penitentiary and the Confederate soldiers' home are at Nashville.

CITIES. The chief cities are Nashville, the capital; Memphis, Knoxville, Chattanooga, Jackson, Clarksville, Columbia, Johnson City and Bristol.

HISTORY. Tennessee, named for its chief river, the Cherokee "crooked

river," was probably first visited by De Soto in 1541. One hundred and forty years later, La Salle built Ft. Prud'homme on the present site of Memphis. Daniel Boone and James Robertson early built posts for the Indian trade of the territory, which, under the Watauga Association, established in 1772, was practically independent for years. In 1748 Virginians discovered and named the Cumberland Mountains and Gap, through which by 1770, a flood of migration was pouring.

In 1776 Tennessee became a part of North Carolina. Indignation, however, soon arose, not only because the parent state took no steps to quell frequent Indian disturbances in Tennessee, but because it ceded it to the United States without consulting the inhabitants. The act of cession was repealed in 1785; but the State of Franklin, with John Sevier as governor, had already been formed. This was ignored by Congress. In consequence, Tennessee returned to North Carolina. Meanwhile, Nashville had been established by John Donelson, whose daughter Rachel became the wife of Andrew Jackson. After 1790, being again ceded to the government, Tennessee was known as the "Territory South of the Ohio." June 1, 1796, it became a state.

At the outbreak of the Civil War Tennessee wavered, then seceded in June, 1861; it sent over 100,000 men to the Confederate army and about 30,000 to the Union army. Since its period of reconstruction Tennessee has enjoyed great prosperity. Consult McGee's *History of Tennessee*.

GOVERNORS. John Sevier, 1796-1801; Archibald Roane, 1801-1803; John Sevier, 1803-1809; Willie Blount, 1809-1815; Joseph McMinn, 1815-1821; William Carroll, 1821-1827; Sam Houston, 1827-1829; William Hall, 1829; William Carroll, 1829-1835; Newton Cannon, 1835-1839; James K. Polk, 1839-1841; James C. Jones, 1841-1845; Aaron V. Brown, 1845-1847; Neil S. Brown, 1847-1849; William Trousdale, 1849-1851;

William B. Campbell, 1851-1853; Andrew Johnson, 1853-1857; Isham G. Harris, 1857-1862; Andrew Johnson, 1862-1865; William G. Brownlow, 1865-1869; DeWitt C. Senter, 1869-1871; John C. Brown, 1871-1875; James D. Porter, 1875-1879; Albert S. Marks, 1879-1881; Alvin Hawkins, 1881-1883; William B. Bate, 1883-1887; Robert L. Taylor, 1887-1891; John P. Buchanan, 1891-1893; Peter Turney, 1893-1897; Robert L. Taylor, 1897-1899; Benton McMillin, 1899-1903; James B. Frazier, 1903-05; J. I. Cox, 1905-07; M. R. Patterson, 1907-11; Ben W. Hooper, 1911-15; T. C. Rye, 1915-19; A. H. Roberts, 1919-21; A. Taylor, 1821-23. A. Peay, 1923-27; H. H. Horton, 1927—.

Tennessee River, the largest tributary of the Ohio, formed by the union of the Holston and the North Fork, which unite near Kingsport in the northeastern part of Tennessee. Authorities differ as to the extent of the Holston, some regarding it as extending to the junction with the French Broad at Knoxville; others say that it extends to the Clinch River at Kingston. The Tennessee flows southwestward across the state and crosses the southern boundary near the northeastern corner of Alabama. It then flows in a general westward direction across Alabama, turns northward, crosses Tennessee and Kentucky and enters the Ohio at Paducah. Its length, including the Holston, is about 1200 m. It is navigable for large steamers to Florence, Ala., a distance of 270 m. from its mouth. At this point the Muscle Shoals obstruct navigation, though this has been remedied to some extent by canals. Above the Shoals the river is navigable to Knoxville.

Tennessee, University of, at Knoxville (1794). It was established as Blount College in 1794, became East Tennessee College in 1807, East Tennessee University in 1840, 60 years later secured control of the Federal land grant of 1862 and in 1879 was given its present title. It is one of the earliest American state universities to open for stu-

dents. It maintains a graduate department; colleges of liberal arts, law, engineering, agriculture, and education; schools of pharmacy, commerce, home economics, and nursing; agricultural and engineering experiment stations; general and agricultural extension divisions. At Memphis are departments of medicine, pharmacy, and dentistry; at Martin a junior college of agriculture and other vocational arts. The faculty numbers about 380; there are about 5580 students.

Ten'nis. See LAWN TENNIS.

Tennyson, Alfred (1809-1892), a foremost English poet, born at Somersby, Lincolnshire. His father was rector of the parish and Alfred's instructor from the time the boy was 12 until he was ready for Cambridge. Tennyson's poetic gift was manifested when he was still a child, and he records that when he heard the news of Byron's death (Apr. 19, 1824), he went into the woods and carved on a rock, "Byron is dead." Some of his early poetry was published in 1827 in a volume entitled *Poems by Two Brothers*, a portion of the poems being the work of his elder brother Charles. In 1828 Tennyson entered Cambridge, where he formed a close friendship with Arthur Henry Hallam, son of the historian. A volume entitled *Poems, Chiefly Lyrical*, issued in 1830, showed England that a new poet was appearing to take the place of Byron. In 1831, soon after his father's death, Tennyson left Cambridge without taking a degree.

He now removed to the rectory at Somersby and devoted himself to writing. At the close of 1832 he issued a second volume of *Poems*, containing such finished productions as *The Lady of Shalott*, *The Dream of Fair Women* and *The Palace of Art*. Shortly after this happy promise of his poetic career, he received the news of the death of his friend Arthur Hallam, an event that affected him profoundly and was the inspiration of a series of elegies which he published 17 years later in the form of that great elegy *In Memoriam*. It was ten years before another edition of poems appeared, but the years of reflection and study bore rich fruitage, and

the volume appearing in 1842, which contained the well-known *St. Simeon Stylites*, *Dora*, *Locksley Hall*, *The Two Voices* and *Break, Break, Break*, took the public by storm. In 1847 came his first long poem, *The Princess*, a half-humorous treatment of the "woman question," containing some of his rarest lyrics. The year 1850 was important for the publication of *In Memoriam*, Tennyson's marriage and his appointment to the poet laureateship to succeed Wordsworth.

In the winter of 1853 the Tennysons removed to a little house and farm called Farringford, in the Isle of Wight, and here were written *Ode on the Death of Wellington* and *Charge of the Light Brigade*. In 1859 the first series of the *Idylls of the King* appeared, attaining an overwhelming success. In 1884 Tennyson, yielding to the request of his friend Gladstone, took his seat in the House of Lords as Baron Tennyson. He retained his intellectual vigor and freshness of spirit to the last, and the writings of his later years show no decline of his powers. Chief among these are the remaining *Idylls of the King*, several dramas, *Enoch Arden*, *Locksley Hall Sixty Years After* and *Demeter and Other Poems*, the last containing his imperishable *Crossing the Bar*.

Tennyson is remarkable for the range and finish of his style. He attempted every kind of poetry and attained high excellence in every form except the pure drama. Perfectly blending together elements from many sources, he attained an exquisite and flawless style that has come to be known as "Tennysonian." His poetry as a whole, while lacking in passion and tragic power, is characterized by wonderful beauty, richness and serenity, and reveals his wide range of sympathy, sense of law and harmony, and profound religious spirit. The representative writer of an age that was characterized by a search for truth and new movements in scientific and social fields, he stood forth as the prophet of

hope and faith, an inspiration to those who believe that spiritual and not material things are the eternal realities.

Tent, a portable structure made of canvas, skin, rugs or other material used for shelter. The Arab's tent is large and low, often affording shelter for his beasts, as well as for himself. The Romans used a tent made of canvas stretched over two upright poles and a ridge pole, much like the present camping tent. The modern military tent is usually round, about 12 ft. in diameter, and affords sleeping room for 16 men. The small dog tent of the United States soldier will give a degree of shelter to two men. This is called the shelter tent and is carried by the soldier. The common tent has a wall, and a floor space of 8 by 7 ft., accommodating three men; the wall tent has a floor space of 9 by 9 ft.; the conical wall tent, 16 ft. in diameter; and the hospital tent, 14 by 14½ ft. In a military encampment the tents are put up in rows, leaving a space between them of about one-half their width.

Ten'ure of Office Act, the name given to a number of different acts of Congress, by which the term of public officials or the manner of their appointment and removal was decided. The first of these acts was passed in 1820, making a four-year tenure for many Federal positions which formerly had been held indefinitely or during good behavior. The passage of this act opened the way for a change in office at the end of each national administration.

The most important act, however, was that passed in 1867, during the term of office of President Andrew Johnson, which limited the power of the president to remove public officials from their positions. The substance of the act declared that officers receiving their appointment through confirmation by the Senate should hold their positions "for and during the term of the president by whom they may have been appointed, and for one month thereafter, subject to removal only by and with the con-

sent of the Senate." This act was the outgrowth of the difficulty between Congress and President Johnson, who had dismissed from office many officials not in sympathy with his policy. The President declared such a right existed in accordance with the custom established by a century of history, and vetoed the bill, but it was at once passed again over his veto and became a law.

Terborch, *Ter bork'*, or **Terburg**, **Gerard** (1617-1681), an eminent painter of the Dutch School, born at Zwolle. His father, who was a draughtsman and etcher, gave him his first instruction, and later he studied at Haarlem with Pieter de Molyn, being influenced at the same time by Frans Hals. This influence is seen in his *Consultation*, *Knife-Grinder's Family* and *Boy with a Dog*. He worked in various places, London, Amsterdam, Münster, where his greatest work, *Peace Congress of Münster*, with its 60 portraits, was painted, and in Spain, where he was knighted by Philip IV. Between 1650 and 1660 he executed most of his charming scenes of everyday life, which have made him famous; namely, *The Concert*, *Officer Reading Letter*, *The Music Lesson*, *Trumpeter Delivering Love-Letter*, *Lady Washing Her Hands*, *The Reading Lesson*, *Paternal Admonition* and countless others. Two of his pictures are in the Metropolitan Museum, New York.

Tere'do, or **Shipworm**, the name given to a wormlike Mollusk that is notorious for its ravages in boring into ship timbers and the submerged portions of wharves and docks. The teredo has a shell consisting of two valves situated near its anterior end, and the full-grown worms are from one to three feet in length and nearly half an inch in diameter. They are deposited in the wood in the form of larvæ, and eat their way in the direction of the fiber, swallowing the dust as they bore their way along, and leaving behind a clean-cut groove, in which they deposit an incrustation of calcareous matter. The holes are generally bored straight, un-

less some obstacle like a knot or nail is met with, and, although many of these worms may be boring into the same stick of wood, they never cross the groove of another. Instead, they leave their partitions between them, thus destroying the wood by honeycombing the entire stick. All woods, except a few of the very hard kinds, such as the ironwood of India and the jarrah wood of Japan, are attacked by the teredo. Yellow pine seems especially liked by these worms.

In order to protect the bottoms or hulls of wooden ships from the teredo, it is necessary to sheath them completely with copper plates or paint them frequently with a mixture containing copper. For the protection of piling and submerged portions of wharves and docks, the creosoting process is much used.

Ter'ence (about 185-about 159 B. C.), the name generally applied to Publius Terentius Afer, a Roman poet and playwright, born at Carthage, Africa. Brought to Rome, he became the slave of Publius Terentius Lucanus, a Roman senator who gave him his freedom after having assisted him in procuring a liberal education. In B. C. 166 the play, *Andria*, the first success of Terence, was staged, and the author rapidly gained admission to the best society of Rome. He went to Greece, from where he never returned, studied there the best Greek comedies, adapted them for the Roman stage and wrote original productions. The charm of his work consists in a wit which is less lively than that of Plautus, but more tender, in careful and consistent construction of plot and in its metrical skill. The extant plays are *Andria*, *Hecyra*, *Heauton-timoroumenos*, *Eunuchus*, *Phormio* and *Adelphia*.

Terhune, *Ter hune'*, **Mary Virginia** (1831-1922), an American novelist better known as Marion Harland, born in Richmond, Va. In 1856 she was married to Rev. Edward P. Terhune of Brooklyn, and later removed to Massachusetts, becoming connected, editorially,

with *Babyhood*, *Wide Awake*, *The Home-Maker* and *Saint Nicholas*. Under the pen name of Marion Harland she published many sketches of travel, domestic manuals, short stories and novels. They include *Alone*, *A Tale of Southern Life and Manners*, *Miriam*, *Nemesis*, *Common Sense in the Household*, *Marion Harland's Complete Cook-Book*, *When Grandmama was Fourteen* and *The Distractions of Martha*.

Ter'mite, or **White Ant**, a family of the order Isoptera, or equal-winged insects. The popular name, white ant, is given because in habits these insects are much like the ants, but there is little structural likeness between them, and they are members of different orders. The termites are among the classes of insects which have developed castes, or differently constructed individuals, whose duties in the colony are widely unlike. In the adult stage the king and queen are distinguished from the rest by having two pairs of long, narrow wings of leathery texture that lie flat upon the back when not in use. Each colony has but one king and queen, and these are treated royally though imprisoned in a cell at the base of the large, many-roomed nests. The workers, which are of both sexes, are blind, wingless creatures of dirty white color. They must build the nest, bring food for the entire colony, wait upon the queen, carry the eggs to the cells constructed for them, and feed and care for the larvæ when hatched. A third class consists of the soldiers, distinguished by their large heads and formidable claws. To them is given the task of protecting the colony from invasion. The nest of the termite is a huge, mud-built mound of many compartments and often 12 or 15 ft. high. It is constructed entirely by the workers, which also have long, covered passages to build, for they are obliged to reach an object to which they cannot make a tunnel, the covered passage must be made to shut out the light.

The eggs of the termites hatch into adults almost without any larval or pupal stages. When the young become mature, the kings and queens voluntarily leave the nest for their one and only flight. If, at the close of their flight, they are not found by a colony of workers they die, since they are unable to provide for themselves.

Termites are abundant in the tropics, where they are injurious to orange trees and sugar cane. They are also destructive of wood and are known to work within the frames of tables and chairs until only the shell remains standing. Frame buildings in Southern cities have been rendered unsafe by the insidious work of this insect. They may be driven out by injecting bisulphide of carbon into their nests or sprinkling it wherever they occur. The nests and plants which they infest should be destroyed. See INSECTA.

Tern, sea birds of the Gull Family, with elongated bodies, long, pointed bills, short legs, webbed feet, forked tail and long, slender, pointed wings. They live in nearly all parts of the world and spend the most of their time on the wing, their long, pointed wings giving them excellent powers of flight. Upwards of one dozen species live in America.

COMMON TERN. This bird is 15 inches long and about the size of a domestic pigeon. It is light pearl-gray, with a white throat and tail. The top of the head is black, the feet and bill are orange, and the bill is tipped with black. The nest is placed in a depression in the sand and is made of grass and seaweed. Two to four brown-spotted eggs are laid. Sometimes the eggs are laid on the bare rock. The wings of these birds are used for millinery purposes.

Ter'race, in geology, a natural step in a comparatively level plain of limited width along the shores of a river, lake or ocean, due to erosion. Terraces sometimes occur in series, one above the other. The most typical of these ter-

teraces are formed by running water. A river terrace is caused by the cutting down of the stream's flood plain. If a stream becomes for a time overloaded with detritus, it overflows its banks and fills up its valley. When later the amount of solid matter held in suspension is so adjusted to the volume and velocity of the water that the stream neither wears down nor builds up its bed, it begins to remove the material which was temporarily laid down in its flood plain by directing its cutting power against its banks. Large terraces are occasionally found, each of which marks the banks of the stream in some past geological age. Marine terraces are formed by action of the waves upon sands washed up by the sea.

In agriculture a terrace is a device used to prevent erosion on cultivated hillsides. The slopes are divided into flat belts separated by vertical walls, in a series of steps. The rains do not erode the terraces and the walls retain moisture. Terraces are also used in architecture and in landscape gardening.

Terra Cotta, *Ter' a Kot' a*, a hard, fired, clay product similar to unglazed earthenware. It is employed in making vases and statuettes, and as an architectural material, chiefly for decorative purposes. The ancient Greeks made vases of terra cotta, and pottery made of it has been found in the remains of Assyrian and Persian buildings. The so-called Egyptian porcelain is terra cotta, covered with a glasslike glaze and burned to extreme hardness. This was employed in making statuettes, justly celebrated for their beauty. Terra cotta is extensively used for architectural ornaments in brick and stone buildings. It can be made in any color required, is light, strong and durable. Moreover, it can be easily molded into any form desired, and when the mold is once made, any number of duplicates can be produced. Some of the finest examples of terra cotta are made in the United States.

Terra cotta is made from clay, or clay mixed with old fire bricks ground to a fine powder. The mixture is allowed to stand and weather for a long time, and when this process is completed, is washed, ground and mixed with water. The operation takes place in a pug mill or in a long box containing a number of rollers, and the process is continued un-

til the ingredients are thoroughly mixed; the coloring matter is then added, and the substance is run into molds and set aside to dry. If the pieces are large the drying requires several days, and must be done very slowly to avoid cracking. The dried terra cotta is burned in kilns, when it is ready for use.

The white, glazed terra cotta, now being used in New York, Pittsburgh, Chicago and other cities, has proved an ideal material to cover the fronts of tall buildings, for the reason that the dirt and soot are easily and quickly removed. See **BRICK**.

Ter'rapin, a name applied to several species of edible, fresh-water turtles of the Emydid Family, found along the eastern and southern coast lines of the United States. They inhabit the marshes or small lakes and feed upon fishes, frogs and reptiles. There are several species, but in the United States the name terrapin is generally understood to refer to the diamond-backed terrapin most used as a food. See **TURTLE**.

Terre Haute, *Ter' e Hote'*, Ind., an industrial city and the county seat of Vigo County, 73 miles southwest of Indianapolis and 178 miles south of Chicago, on the Wabash River and on the Pennsylvania, the New York Central, the Chicago & Eastern Illinois, and the Chicago, Milwaukee & St. Paul railroads. Dresser Field, about two miles south of the business district, is a well-equipped airport. Terre Haute lies about 30 feet above the normal level of the river; hence its name. The surrounding country is a rich agricultural and bituminous-coal-mining region, for which the city is the distributing point. Sand and gravel, clay, iron, and natural gas are other natural resources of the district which are of commercial importance.

A large variety of commodities is produced in Terre Haute's factories. Among the leading products are stamped enamel ware, glass containers of all kinds, malleables, iron and steel bars, coke, coal-tar, and by-products, strawboard, fiber boxboard, fiber and

wooden boxes, catsup, canned tomatoes, canned pork and beans, packed meat, flour, brick, tile, chemicals and solvents, beverages, mining machinery, furniture, and workmen's clothing. Other industrial establishments are railroad shops and a slaughter house. The city has two large electric light and power plants, one of which mines its own coal.

Terre Haute has a number of parks and playgrounds and two municipal swimming pools. The Municipal Stadium, a war memorial, seats 16,000 people. There are a number of institutions for the care of the needy poor, including the Glenn Home for Dependent Children, Rose Orphan Home, Clara Fairbanks Home for Aged Women, Rose Dispensary, a day nursery, and a social settlement.

Among Terre Haute's educational institutions are the Indiana State Normal School, established in 1870, and the Rose Polytechnic Institute, a college for men established in 1874. Near by, at Notre Dame, is St. Mary-of-the-Woods College and Academy, a Roman Catholic institution for girls.

Terre Haute was founded in 1816 and was incorporated as a city in 1833. It is governed by a mayor and common council. Population, 75,985.

Terrier, a breed of small, light dogs, including many varieties. There are both long-haired and short-haired breeds and they vary greatly in size. All stand rather high, have strong, active limbs, broad chests, and tapering bodies. Their tails are apt to be held stiff and their ears generally droop slightly, if not entirely. Many of them are excellent sporting dogs, though some confine this instinct to the capturing of mice and other insignificant prey. Others are particularly good companions and combine faithfulness and intelligence. The bull terrier, which is popular in the United States, is a cross between the bulldog and the smooth terrier. The Yorkshire terrier has an especially long and thick coat of hair, which entirely conceals its legs. The Fox terrier, Scotch terrier, and Skye terrier

are treated under their respective titles in these volumes.

Ter'ri'tor'ial Wa'ters, those under the jurisdiction of sovereign states. They include (1) waters entirely within national boundaries and (2) the maritime belt of three miles from low tide mark. Waters separating sovereign states are usually divided between them. The right of self-protection determines territoriality; and by this principle, usually confirmed by treaty, many wide arms of the sea are territorial and waters connecting important non-territorial waters are open to the passage of all innocent vessels. The maritime belt is sometimes extended by treaty for purposes of law enforcement.

Vessels in territorial waters are subject to the laws of the state. Vessels suspected of offenses within those waters may be pursued from them and captured on the high seas, provided **pursuit is continuous**.

Ter'ritory, the term applied in the United States to parts of the national domain which have not been formed into states. The political status is one of dependence upon the Government of the United States. Each territory has a popularly elected Legislature, a governor who is appointed by the president for a term of four years, and a series of courts, the higher judges of which are also appointed by the president and paid from the United States Treasury. The organic law of the territory consists of the Federal Constitution and the act of Congress organizing the territory, in the framing of which the inhabitants have no part. A territory is not allowed to be fully represented in Congress, but may choose a delegate who is given only the privilege of a seat in the House of Representatives, with the right to serve on committees but not to vote. Likewise, the citizens of a territory cannot participate in the election of president and vice-president, but are allowed to send delegates to national conventions for the nomination of presidential candidates.

The civil rights of the inhabitants are nearly the same as those of citizens of states admitted into the Union. All the states thus far formed out of territory acquired from foreign nations, except California and Texas, have passed through the territorial stage. There is no general rule as to the period of time through which the territory shall be required to pass, but the nearest approach to it is the requirement that the number of inhabitants shall equal that required for a single representative in Congress. In a number of instances, however, the inhabitants have adopted a constitution and then applied for admission to the Union before this number was reached. In 1901 the Supreme Court decided that Congress may determine when new territories are to be incorporated into the Union, and it is also empowered to legislate differently for the different parts of the national domain. With the admission into the Union of Arizona and New Mexico, the last organized territories in the United States proper became states.

Terry, Alfred Howe (1827-1890), an American soldier, born in Hartford, Conn., and educated at Yale. Admitted to the bar in 1849, he practiced law from 1854 to 1860. At the outbreak of the Civil War he became colonel of the Second Connecticut Volunteers and rendered efficient service at Bull Run. He was attached to Sherman's expedition to South Carolina, occupying Hilton Head, and aided in capturing Port Royal and Ft. Pulaski, the latter of which he then commanded. He next had command in Florida, and following that was conspicuous against Ft. Wagner, Petersburg and Richmond. In January, 1865, he aided Porter's fleet in capturing Ft. Fisher, and he later took Wilmington, N. C. At the close of the war he was brevetted major-general in the regular army, and in 1876, in command of the Department of Dakota, he drove Sitting Bull into Canada. Ten years later he succeeded General Hancock as full major-general and in 1888 he retired.

Terry, Ellen Alicia (1848-1928), an English actress born at Coventry. Her parents and her sisters and brothers were actors. She first appeared on the stage in 1856, playing under the management of Charles Kean in the *Winter's Tale*. She was married to G. F. Watts, the painter, in 1864, retired, but resumed her career ten years later. In 1878 she began to act with Henry Irving, the long association being discontinued only with his death. She first visited America in 1883. An enthusiastic stage jubilee was celebrated in London in 1906, when both England and America paid tribute to her with great acclaim. She married James Carew, an American actor, in 1907, and that year she played in the United States with her own company. Despite various criticisms, her place among the leading English actresses is now undisputed. Her most triumphant rôle has been as Portia in *The Merchant of Venice*. In addition, she has played in several other Shakespearean dramas, in Tennyson's *Becket*, as Clarisse in *Robespierre*, Madame Sans-Gêne in Sardou's play, in Goldsmith's *Vicar of Wakefield* (dramatized), Reade's *Nance Oldfield* and several plays of G. Bernard Shaw.

Tertul'ian (Tertullianus), Quintus Septimius Florens (about 160-about 230), one of the most famous Latin Fathers of the Church, born in Carthage, North Africa, of heathen parentage. He received a first-class education both in Latin and in Greek and was trained for the law, which he practiced successfully in Rome. Converted to Christianity near the end of the second century, he returned to Carthage and there spent the rest of his life. Either before or after this, however, he visited Greece and perhaps Asia Minor.

Possessed of wide knowledge and experience, Tertullian was the creator of the Latin Church literature, the previous writings having been in Greek. He left an indelible impress upon the Western theology of the Church, to which, owing doubtless to his training, he imparted that legalistic character which passed on

through Augustine to Protestantism. He was a man of great originality, intensity and genius, intellectually keen and alert, forceful, strenuous, passionate, enthusiastic and purposeful. He wrote an immense number of works, many of which are now of great historical value.

Tes'la, Nikola (1857-), an American electrician, born in Croatia, in the border country of Austria-Hungary. He was the son of a Greek clergyman and orator and of Georgina Mandic, who was an inventor, as was her father. Following a course in the schools of his native province, he studied engineering at Gratz, preparatory to becoming a professor of mathematics and physics. However, he became interested in electricity and consequently began to study electrical engineering. He worked in the telegraphic engineering department of the Austrian Government until 1881, and three years later came to America, where he was employed for some time with the Edison Company, Orange, N. J. Subsequently he devoted his energy to experimental research, inventing much improved apparatus. Tesla developed the principle of the rotary magnetic field, which paved the way for transmitting power through alternating currents, especially on long-distance lines, and invented various dynamos, transformers, induction coils, oscillators and arc and incandescent lamps. He is best known, however, for his researches concerning alternating currents of high frequencies and potentials.

Tet'anus, or **Lockjaw**, a disease marked by spasmodic contraction of the muscles. In severe cases the body is distorted and the upper and lower jaws held together so tightly that they cannot be separated. Lockjaw is believed to be caused by a bacillus in the soil, which enters the body through wounds. Treatment with tetanus antitoxin has been successful, but statistics show that only about ten per cent of the cases recover.

Teutonic, *Tu ton' ik*, **Race**, the name applied to a division of the European

peoples, embracing the bulk of the inhabitants of the German Empire, the inhabitants of the Scandinavian countries Netherlands, Great Britain, Switzerland, the United States, Newfoundland, Australia, New Zealand and Cape of Good Hope Province, and part of the inhabitants of Austria and of Belgium (Flemings). Representatives of this race are also found in Hungary and in the Baltic states, Finland and other parts of Russia. The oldest-known home of the Teutons is thought to be the region between the middle and lower courses of the rivers Elbe and Oder, and they occupied adjacent tracts of territory about the second century B. C. Thereafter they continued to penetrate into various parts of the Roman Empire. Important invasions were those of the Burgundians, Vandals and Goths southward toward the Danube and thence westward into Italy, Gaul, Spain and Africa, and the invasion of Celtic Britain by the Saxons, Jutes and Angles. Other Teutonic movements were the raids of the Norse Danes and Norwegians into the north European islands, France and the Mediterranean coast, the settlement of Iceland and Greenland and the Norman Conquest of England and of southern Italy and Sicily.

Tex'arkan'a, Ark.-Tex., adjoining cities on opposite sides of the boundary line between Arkansas and Texas, in Bowie County, Tex., and in Miller County, Ark. Texarkana, Ark., is the county seat of the latter county. They are situated 28 miles from the southeast corner of Oklahoma, on the Texas & Pacific, the Kansas City Southern, the St. Louis Southern, and the Missouri Pacific railroads. There is a municipal airport three miles northeast of the cities, adjoining the Missouri Pacific Railroad.

Texarkana is an important agricultural distributing center and a manufacturing center. There are valuable forests of pine, oak, and ash near by, which make lumbering an important industry. One of the world's largest

plants for creosoting timbers is situated here. Other leading products of the cities' industrial establishments include cotton, cottonseed oil, furniture, fertilizers, caskets and cedar chests, overalls, crates, sulphur, galvanized iron products, steam engines, brick and pottery, and sash and doors. There are also railroad shops and the general offices and bus shops of the Southwestern Transportation Company. Texarkana has natural gas from one of the largest fields in the world.

Texarkana includes two separate municipalities, both of which have the commission form of government. There are two mayors and one joint fire department and food-inspection service. There is one federal postoffice built across the border line between the cities. The school systems are separate. Both cities were founded in 1873. Texarkana, Texas, was incorporated in 1876 and Texarkana, Arkansas, four years later. Population of Texarkana, Texas, 12,900; of Texarkana, Arkansas, 8,500.

Texas. Popularly known as the "Lone Star State," Texas, the largest state in the United States, is remarkable not only because of its bigness, but because of the variety and extent of its resources and because of its romantic history.

LOCATION AND SIZE. So great is the extent of Texas that though next to Florida it is the southernmost state in the Union, it extends northward almost to the geographical center of the country, and though a Gulf state, it lies midway between the Atlantic and Pacific oceans. It is bounded on the n. by Oklahoma, on the e. by Arkansas and Louisiana, on the s.e. by the Gulf of Mexico, on the s.w. by Mexico, the boundary being defined by the Rio Grande, and on the w. by New Mexico.

The extreme length from north to south is nearly 800 m. and from east to west it is about 750 m. The area is 265,896 sq. m. (including 3,498 sq. m. of water)—five and one-half times that of New York. Texas could contain all

the New England States and the Middle Atlantic States and have more than enough room for Illinois besides. If one were to go from Texline in the northwest corner to the mouth of the Rio Grande in a direct line, one would travel farther than from Chicago to New York. Were Texas as densely populated as Massachusetts, its population would be greater than that of the whole United States.

POPULATION. According to the United States census of 1920, Texas had a population of 4,663,228. This was a gain of 766,686, or 19.7 per cent over that of 1910, an average population of 17.8 to the square mile. Of the people, 84 per cent were white, more than 76 per cent of these being natives and less than 8 per cent foreign born, most of the foreigners being Mexicans. The rural population was about twice that of the urban. In total population the state ranks fifth in the United States.

SURFACE. The surface of Texas is in the main a series of more or less dissected plateaus sloping towards the coast. The region in the west between the Pecos River and the Rio Grande is mountainous, Guadalupe Peak, 9,500 ft. high, on the New Mexican border, being the highest point in the state. In the northwest is a portion of the flat tableland known as the *Llano Estacado*, or Staked Plains, so called, it is said, because the mission fathers that crossed this arid region set up buffalo heads on stakes to mark the trail. These plains have a maximum elevation of 4,000 ft. The central basin is a region of varying relief with ridges, prairie valleys, isolated tablelands, and river courses. To the west and south of this is the plateau region, while to the east is the famous black prairie region. Farther east is the great area of lowlands belonging to the coastal plain, which rises gradually from sea-level to an altitude of 500 ft. about 150 m. inland. Long, low islands extend along the coast, forming lagoons. There are several indentations on the coast, the most important being Galveston, Matagorda, and Corpus Christi bays.

RIVERS. The northern part of the state is drained by the Canadian River, which joins the Arkansas in Oklahoma, and the Red, which forms a part of the boundary between Texas and Oklahoma. South of the Red is the Sabine, which, flowing south, forms a part of the eastern boundary. Southwest of the Sabine are the Neches, the Trinity, the Brazos, the Colorado (of Texas), the San Antonio, and the Nueces, all flowing directly into the Gulf. The southern and western parts of the state are drained by the Rio Grande, and its tributary the Pecos.

CLIMATE. Variation in latitude and to a lesser extent in altitude give different parts of Texas a wide divergence in climate. In the south it is almost tropical and citrus fruits grow luxuriantly; while in the Panhandle, as the northern extension of the state is called, it has been known to fall below zero. In winter a fall of 40 or 50 degrees may be produced in a few hours by severe north winds known as northers. Along the coastal plain the climate is more uniform. Frost seldom occurs. The gulf breezes blow with great regularity during the whole year, except when northers are in action, and serve greatly to lessen the summer heat. The winters are delightful, beautiful days coming in great numbers between the northers. The rainfall decreases westward. In the east it varies from 50 to 60 inches. In the central and western part of the state it is from 20 to 30 inches, while in the extreme west it is insufficient for agriculture without irrigation.

SOIL. The soil also is varied. The alluvial bottom lands of the lower river valleys are among the most fertile in the state. The black waxy soil of the black prairie belt in the east is a marl composed of clay mixed with disintegrated cretaceous limestone and is exceedingly rich. To the west of this is a belt of soil that is thinner and more rocky but also good for farming. The soil of the central basin varies with the character of the underlying rocks. The staked plains are mostly covered with a red sandy loam, which is

fertile when irrigated.

IRRIGATION. There are nearly 3,000,000 acres of irrigable land in Texas, of which more than 700,000 acres are actually irrigated. Irrigation is carried on not only for the reclamation of semi-arid lands, but for the intensive production of fruits and vegetables in some regions where farming without irrigation is also carried on, and in the southeast, a region of normal heavy rainfall, for the purpose of carrying on rice production.

The Rio Grande is the source of water for about 40 per cent of the irrigated area of the state, part of it coming from the Elephant Butte project in New Mexico about 120 m. n. of El Paso, Tex. In Texas this water is used in the vicinity of El Paso. The Rio Grande above El Paso and for some distance below that point, in its natural condition, was subject to heavy floods, for much of the time it was low, and at times it was entirely dry. Under such conditions it was not of much value as a source of irrigation. To remedy this condition the United States Reclamation Service built the Elephant Butte Dam. The capacity of the reservoir created by this dam is about 2,600,000 acre feet, or about $2\frac{1}{2}$ times the annual discharge of the river at that point. There is much irrigation along the lower Rio Grande, the citrus and winter garden area.

AGRICULTURE. Agriculture is the chief industry and Texas ranks first among the states of the United States in the value of her farm products. Cotton is the chief crop and in its production Texas leads the Union. Cotton is successfully cultivated not only in the central and southern parts of the state but in the west and in the Panhandle. These regions of the west have the advantage that the boll weevil, which preys on the cotton crop elsewhere, cannot exist there because of the altitude and the dryness of the climate. Corn ranks next in importance. It is grown in every section of the state where the soil is cultivated, most of it being consumed on the farms by Texas stock. Wheat and oats are also extensively grown. Texas is the leading state



TEXAS. (1) Fort Brown, showing Brownsville in the distance. (2) Historic Alamo in San Antonio. (3) Cattle on prairie. (4) Ginning plant. (5) Airplane view of Dallas.

TEXAS



Texas Steers

Blue-
Bonnet,



State
Flower



Cow-Boy

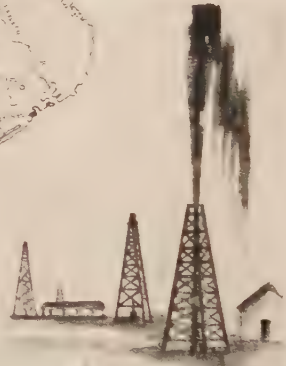
The Lone Star State



Greatest
in Cotton
Production



The Capitol,
Austin



Petroleum,
Important
Industry



University of Texas,
Austin



The Alamo, San Antonio

in the production of grain sorghums, and sweet sorghums, used in making syrup, and sugar cane are also of some importance. Rice of excellent quality is grown in the irrigated areas of the coastal plain. Melons, peanuts, potatoes, sweet potatoes, and tomatoes, onions, spinach, and other garden vegetables are raised in large quantities.

All fruits and berries common to the temperate regions are raised in the eastern and central parts of the state, where there are some of the largest peach orchards in the world. Grapefruit, oranges, lemons, figs, and other fruits common to semi-tropical regions are grown successfully in the southern part of the state along the Rio Grande. Texas is the foremost state in the production of pecans. It not only furnishes the largest percentage of the world's supply but is noted for the quality of the nuts, large thin-shell varieties having been produced by grafting.

A large part of the land, especially in the southwestern part, is still used for grazing. In central west Texas, the Plains, and the Panhandle, many of the ranches are giving way to farms. Texas has more cattle than any other state in the Union, and ranks almost as high in the number of horses, mules, and sheep. Although Texas is chiefly noted as a beef-producing state, the dairying industry has had a rapid growth in recent years. Texas is one of the chief wool-producing states. The keeping of bees is an important industry, several million pounds of honey being produced annually. Poultry raising also receives considerable attention.

FISHERIES. Valuable fisheries are found along the coast where food fish of great value are taken in large numbers. Oysters are also found here and oyster beds have been developed.

FORESTS AND LUMBER. There is an extensive timber belt in eastern Texas where longleaf, shortleaf, and loblolly pines are found intermingled with oak, hickory, and other trees. Lumber and timber products from this region bring in an income annually of millions of

dollars. In central and southwestern Texas there is timber of a more scrubby type, some of which is useful for building-logs and fence-posts, while some of the hardwood can be used for furniture. In the mountainous regions west of the Pecos River are small forests of yellow pine. The production of lumber is one of the leading manufacturing industries.

MINERALS AND MINING. Texas lies partly within the Mid-Continent Oil Field, which extends into Oklahoma and northern Louisiana, and partly within the Gulf Coast field, which extends into southern Louisiana. It is one of the leading states in the production of petroleum and natural gas. Gasoline extracted from natural gas is an important product. Another important industry is the mining of sulphur, in which Texas ranks first in the United States. Bituminous coal is mined in central northern Texas and lignite in eastern and central Texas. Other mineral products are quicksilver, fullers' earth, asphalt, gypsum, potash, cement, silver, iron, copper, lead, and zinc. Clay suitable for making brick and tile is found in many localities and there are various building stones.

MANUFACTURES. Although Texas is not a great manufacturing state, her manufactures are steadily increasing. Petroleum refining comes first, from the standpoint of the value of the finished product. Other important industries are slaughtering and meat-packing, the manufacture of cottonseed-oil and -cake, flour-milling, the manufacture of lumber and timber products, and the construction and repair of railroad cars.

TRANSPORTATION AND COMMERCE. Texas has adequate transportation facilities both by rail and by water. It has more miles of railway than any other state in the United States. Among the most important roads are the Southern Pacific; the Houston and Texas Central; the St. Louis and San Francisco; the Chicago, Rock Island, and Gulf; the Atchison, Topeka, and Santa Fe, the Missouri, Kansas, and Texas; the Fort Worth and Denver City; the International and Great Northern; the Texas

and Pacific; the Colorado and Southern; the San Antonio and Aransas Pass; and the St. Louis Southwestern. The chief railway centers are Fort Worth, Dallas, Houston, Waco, San Antonio, and Beaumont.

There are more than 1,000 miles of navigable water in the rivers of Texas, while the long coast-line facilitates traffic by sea. Galveston, the chief seaport, is one of the greatest cotton shipping points in the world. Texas ranks high in export trade, having even surpassed New York in the value of goods shipped to foreign markets. The Houston Ship Canal connecting Houston with the Gulf of Mexico makes that city the largest inland cotton market in the world.

GOVERNMENT. The present constitution was adopted in 1876, and has since been amended. The governor, lieutenant-governor, comptroller, treasurer, commissioner of the general land office, superintendent of public instruction, and attorney-general are elected by popular vote for two years, and a railroad commission is elected for six years. The secretary of state is appointed by the governor. The legislature consists of a senate of 31 members, elected for a term of four years and of a house of representatives of not more than 150 members, elected for two years.

The judicial department comprises a supreme court consisting of a chief justice and two associate justices, elected for six years; a court of criminal appeals; courts of civil appeals; district courts; county courts; and justice courts in towns.

EDUCATION. In spite of the problems presented by the difficulty of handling the rural school situation in sparsely settled communities and of caring for a comparatively large colored population, Texas has developed a well-organized school system. Separate schools are maintained for white and colored children. School attendance is compulsory for children from 8 to 14 years of age. The North Texas Teachers' College at Denton, the East Texas Teachers' College at Commerce, the Sam Houston State

Teachers' College at Huntsville, the West Texas Teachers' College at Canyon, the Southwest Teachers' College at San Marcos, the Stephen F. Austin State Teachers' College at Nacogdoches, the Sul Ross Teachers' College at Alpine, the South Texas Teachers' College at Kingsville, and the Prairie View Normal and Industrial College (colored) provide for the training of teachers. The University of Texas is at Austin, with the medical branch at Galveston, and the School of Mines at El Paso. The Agricultural and Mechanical College is at College Station. Branches of it are the North Texas Junior Agricultural College at Arlington and the John Tarleton Agricultural College at Stephenville. Several agricultural experiment stations are maintained by the state. The College of Industrial Arts (for women) is at Denton. The Texas Technological College is at Lubbock. Among the higher educational institutions not under control of the state are Baylor University (Baptist) at Waco, Baylor College (Baptist) at Belton, Texas Christian University (Christian) and Texas Woman's College (Methodist) at Forth Worth, Southern Methodist University and the University of Dallas (Roman Catholic) at Dallas, Howard Payne College (Baptist) and Daniel Baker College (Presbyterian) at Brownwood, Southwestern University (Methodist) at Georgetown, Austin College and North Texas Female College (Methodist) at Sherman, Rice Institute at Houston, and Trinity University (Presbyterian) at Waxahachie.

STATE INSTITUTIONS. There are hospitals for the insane at Austin, Rusk, Terrell, Wichita Falls, and San Antonio, and a state colony for the feeble-minded at Austin. State schools for the deaf, dumb, and blind, for both white and colored students, are at Austin. There is a state orphans' home at Corsicana and homes for Confederate soldiers and for widows of Confederate soldiers at Austin. A home for dependent and neglected children is maintained at Waco, and a state tuberculosis sanatorium at Carlsbad. The state penitentiaries are

at Huntsville and Rusk, the state juvenile training school at Gatesville, and the Girls' Training School at Gainesville.

CITIES. The chief cities are San Antonio, Dallas, Houston, Fort Worth, El Paso, Galveston, Beaumont, Wichita Falls, Waco, Austin (the capital), Laredo, Denison, and Amarillo.

HISTORY. Texas was named for the Tejas Indians, who dwelt on the shores of the Gulf of Mexico. The first white men to visit the country were probably Cabeza de Vaca and three other survivors of the Narvaez expedition, who came in 1528. Other Spanish adventurers traversed the state, but not for a long time was a permanent settlement made. Ysleta, the oldest town in the state, was founded in 1682.

In 1685 the French explorer La Salle, attempting to enter the mouth of the Mississippi River, landed at Matagorda Bay instead and founded a French colony. Although it ended in failure, the Spanish, fearing that France might seize the land, established the mission of San Francisco de los Tejas in 1690. For about a century mission founding went on, though some of the establishments were abandoned and some suffered destruction at the hands of the Indians. The Alamo at San Antonio was among those that survived.

When in 1824 Mexico, which had revolted from Spain, became a republic, Texas which formed a part of it was organized as a state. In the meantime Americans had begun to make settlements in Texas. The first organized settlement was made by Stephen Fuller Austin in 1821 (See AUSTIN, STEPHEN FULLER), and by 1830 there were 20,000 Americans within the limits of the present state.

Roused by Mexican oppression, Texas revolted in 1835. The most striking event in the Texan war for independence was the heroic though unsuccessful defense of the Alamo (See ALAMO). Finally at San Jacinto Sam Houston led the Texans to victory against the Mexican president, Santa Anna, and Texas became an independent republic in 1836. A single golden star on an azure ground

was adopted as the flag of the republic thus giving Texas its name "the lone star state." In 1845 Texas was annexed to the United States. Disputes over the boundary followed, leading to the Mexican War (See MEXICAN WAR).

Texas grew rapidly in population and wealth until the outbreak of the Civil War. In 1861 the state seceded and joined the Confederacy. After a disastrous period of carpet bag rule following the war, Texas was readmitted to the Union in 1870.

In the World War Texas furnished 161,065 men, and suffered casualties to the number of 11,447.

During the time when Texas was a republic the Texas Rangers, a semi-military police organization, came into existence for the purpose of protecting the settlers from hostile Indians and white outlaws. This organization has played an important part in bringing peace and order throughout the state.

Texas, University of. A coeducational institution of higher education under state control, the University of Texas was initiated in 1839 and opened at Austin in 1883. In 1876 1,000,000 acres of land were set aside for establishing and maintaining a state university, and in 1883 another million acres was added to its endowment. The university comprises a college of arts and sciences, a college of engineering, and schools of law, business administration, and education at Austin; a medical branch at Galveston, and a college of mines and metallurgy at El Paso.

Thack'eray, William Makepeace (1811-1863), eminent English novelist. He was born in Calcutta, where his father was engaged in the service of the East India Company. Thackeray was sent to England in 1817, and at the age of 11 entered the Charterhouse School, where he remained until he was 17, later reproducing some of his experiences here, in his novel *The Newcomes*. He spent a little over a year at Cambridge (1829-30), and while there organized a little essay club to which Tennyson belonged. After some desultory art study

and law reading he turned to literature as a profession, beginning with miscellaneous journalistic work — essays, sketches, short stories and burlesques in which he cleverly parodied Scott, Bulwer, Disraeli and others. He contributed nearly 400 sketches for *Punch*. *Vanity Fair*, appearing in 1846-48 in monthly parts, established his position among the great English novelists. Within the next 15 years appeared his remaining novels, best of which is *Henry Esmond*; two series of lectures, delivered in America in 1852-53 and 1855; and the *Roundabout Papers*, a series of essays and sketches written for the *Cornhill Magazine*, of which he was editor in 1860-62. His premature death in 1863 interrupted his work on the novel *Denis Duval*.

Thackeray was admirable in his life and in his art, called "lovable" and "noble-hearted" by Tennyson and Carlyle, a man of remarkable generosity and kindness. Because of the fierceness with which he exposed the sham, pretense and snobbery of his time, he has been called a cynic, but he always wrote with reverence and tenderness for the good and true, preferring to depict life and character as he saw them, with the truthfulness of a realist rather than with the rosy hues of a sentimentalist. To Thackeray and Dickens, friends and contemporary novelists, we are indebted for a wonderful picture of English life in the middle of the 19th century, Thackeray describing the life of the upper classes, Dickens, that of the lower. In their use of pathos Thackeray makes pitiful the fact of weakness, folly and selfishness in human life, Dickens shows how good and innocent characters are exposed to the cruelties of the world. Of the two, Thackeray's humor is the more subtle, as his pathos is the more convincing. His novels are somewhat vague in construction, the story moving on in a casual way with the author appearing now and then for a confidential chat with the reader. His power of character portrayal is unquestioned, and his style unexcelled in English fiction for purity and naturalness.

Thackeray's chief writings are: the early sketches and tales, *The Yellowplush Papers*, *Catherine*, *The Great Hoggarty Diamond*, *Barry Lyndon* and *Snob Papers*; the novels, *Vanity Fair*, *Pendennis*, *Henry Esmond*, *The Newcomes*, *The Virginians* and *The Adventures of Philip*; the lectures, *The English Humorists of the Eighteenth Century* and *The Four Georges*; and a number of ballads and songs.

Thales, *Tha' leez*, the earliest of the Greek philosophers, and founder of the Ionic, or Nature, School, was a native of Miletus in Asia Minor. He flourished in the first half of the sixth century B. C., a contemporary of Solon, and was reckoned as one of the seven wise men. He was famous for his practical and political wisdom and for his knowledge of mathematics and astronomy, which made it possible for him to calculate the height of the Pyramids and, for the first time, the eclipse of the sun. But his chief fame rests upon the fact that he was the originator of philosophy, in that he was the first to set aside mythical and theological explanations of the universe and to seek a first principle that could be grasped through reason. This principle he found in water; but this is now of no special consequence. The important thing is that he started philosophy on its course of scientific development.

Thali'a, one of the nine Muses. She was the Muse of comedy and is represented holding a comic mask.

Thal'lium, a rare element discovered in 1861 by means of the spectroscope. It is a metal resembling lead, and was found in the sediment deposited in the lead chambers of sulphuric-acid factories. Thallium oxidizes readily in air and must therefore be kept under petroleum or in air-tight containers. Thallium received its name, meaning a green branch, because of the green line which it exhibits in the spectroscope.

Thames, *Temz*, the most important river of Great Britain. It rises in the south-central part of England, flows in a southeasterly direction, passes through

London and, expanding into a wide estuary, empties into the North Sea. It is about 250 m. long; at London Bridge its width is about 290 yards, and near the estuary it is 18 m. wide. The chief tributaries are the Cherwell, Thame, Colne, Medway and Kennet. Canals afford communication with the west; the river is navigable 200 m. above its mouth. It is the main source of the water supply of London, about 130,000,000 gallons being withdrawn daily for this purpose. The traffic is enormous, and the accommodations provided for shipping at London and below are both magnificent and extensive. Along the whole course of the river, but more especially near its source, there are attractive wooded banks and picturesque scenery.

Thames River, Battle of the, an engagement of the War of 1812, fought at Moravian Town, on the Thames River, Ontario, Canada, Oct. 5, 1813. Three thousand Kentucky volunteers were commanded by General Harrison, while some 2000 British were under General Proctor and the Indian Tecumseh, who had been in full retreat before the Americans for several days. Overtaken, finally, in an unfortunate position, the British were overwhelmingly defeated. Col. Richard M. Johnson, a future vice-president of the United States, is reputed to have personally killed Tecumseh. The battle practically destroyed the Indian Northwestern Confederacy, put an end to British power in Upper Canada and regained what Hull had lost at Detroit. See HULL, WILLIAM.

Than'et, Octave. See FRENCH, ALICE.

Thanksgiving Day, a national harvest festival fixed by proclamation of the president and the governors of the states, which is set apart as a legal holiday for the giving of thanks. In 1621, after the first harvest of the New England colonists, Governor Bradford made provision for the rejoicing of the people by setting apart a day for prayer and praise, which was repeated often

during the following years. During the Revolution a day of national thanksgiving was annually recommended by Congress. Washington appointed such a day in 1789 after the adoption of the Constitution, and in 1795 he appointed another day as thanksgiving for the general benefits and welfare of the nation. Since 1864 the president of the United States has appointed the last Thursday in November as Thanksgiving Day, and his proclamation has generally been followed by similar proclamations from the governors of the several states.

Thayer, Thair, Abbott Henderson (1849-1921), a distinguished American figure, portrait and landscape painter, born in Boston, Mass. For four years he studied at the Paris School of Fine Arts, chiefly under Gérôme. His earliest success was as a landscapist, but his later endeavor was directed toward a portrayal of ideal subjects. His picture *Angel*, which obtained a medal at the Paris Exposition of 1889, is well known; also his *Mother and Child*, in both of which his family posed as models. Among the most commendable of his more recent works are *Virgin Enthroned*, *Florence*, a fine wall decoration in Bowdoin College, and *Caritas*, in the last of which his particular aptitude for rendering the single female figure with dignity and grace is abundantly illustrated. Thayer was one of the founders of the Society of American Artists, of which he was one time president.

The'ater, a building used for the representation of dramatic productions. The Greeks and Romans had theater buildings which were semicircular in form and without roofs. They were usually located on the slope of a hill, the seats for the spectators being cut out of the rock in rows rising above each other. Each row was an arc, three-fourths of a circumference in extent. Broad passages parallel with the benches divided them into compartments at intervals, and stairs running from the lowest row to the highest intersected them. The chorus performed in a circular

space floored with boards, in front of the spectators, which was called the orchestra. Behind the orchestra and on a higher level was the stage, the back of which was closed by a wall.

During the period between the decline of the ancient drama and the rise of the modern, miracle plays, mysteries and interludes took the place of the regular drama. They were performed in churches, convents, colleges or halls. The first theater building resembling a modern one was built in Parma in 1618. Early theatricals in England took place in tennis courts, inn yards and private houses. Regular playhouses began to be constructed about 1576. Shakespeare's plays were produced at the playhouse in Blackfriars and at the Globe, a six-sided wooden building partly open at the top and partly thatched.

A modern theater is divided into two portions, the auditorium and the stage. The floor of the auditorium slopes down toward the stage, and several tiers of balconies rise in semicircular form at the back. Immediately in front of the stage is a space reserved for the orchestra, and adjoining it are the various rooms used by the players.

A famous modern theater modeled on the Greek type is that of the University of California, at Berkeley. This was erected in 1903, as a gift of Mr. William Randolph Hearst, and cost \$47,000. It seats about 8000 persons, and is the center of musical, dramatic and various other activities of the university.

Thebes, *Theebz*, an ancient city, for centuries the capital of Egypt. It reached its greatest period of prosperity from 1500 to 1000 B. C. About this time it was supplanted by Memphis, and it was ruined by the founding of Alexandria. Only a few Arab families dwell there now, and they earn their living by serving as guides to the travelers visiting the ruins. It was situated about 350 m. southeast of Cairo, and was built on both sides of the Nile. The river divided the city into four quarters, of which the most famous are Karnak and Luxor,

situated on the east side. Here are the most famous ruins of Egypt. See KARNAK, THE TEMPLE OF; LUXOR, THE TEMPLE OF.

Thebes, the most famous city of Bœotia in ancient Greece, situated about 30 m. from Athens. It was the birthplace of Pindar, Pelopidas and Epaminondas, and played an important part in the stories of the heroic age. Thebes seems early to have secured the leading place in the Bœotian League. During the Persian invasion under Xerxes, Thebes fought against the allied Greeks at Plataea, 479 B. C., a proceeding which almost cost her the leadership of the Bœotian League. The city sided with Sparta in the Peloponnesian War, but later gave welcome and shelter to the refugees from the oppression of the Thirty Tyrants. Thebes, with the other Greek states, suffered under Spartan oppression during her supremacy, and in 378 B. C. a war broke out between Thebes and Sparta which culminated in the Battle of Leuctra, 371 B. C. Here the Spartans suffered an overwhelming defeat. Under the brilliant leadership of Pelopidas and Epaminondas Thebes became the chief state in Greece but her supremacy of nine years was ended with the death of Epaminondas at the Battle of Mantinea in 362 B. C. The supremacy of Thebes was followed by years of anarchy in Greece, until the country fell a prey to the ambition of Philip of Macedon. Alexander the Great captured and destroyed the city in 336 B. C. and reduced the inhabitants to slavery. Thebes was rebuilt in 315 B. C., but it never again played a prominent part in history.

Theine, *The' in*. See CAFFEINE.

Themistocles, *The mis' to kleez*, (about 514-449 B. C.), an Athenian general and statesman. He was of an obscure family but received a good education. After the Battle of Marathon his suggestion to meet the Persians on the sea prevailed with the Athenians, and it was due to his generalship and strategy that the Greeks won the Battle of Salamis in 480 B. C. (See SALAMIS,

BATTLE OF). He was intrusted with the most important public works after this victory, but was accused of dishonesty and exiled in 471 B. C. He then went to Argos but fled to the Persian court when the Spartans tried to involve him in the treachery of Pausanias. He was treated kindly at the Persian court, where he soon learned the language, and was later made governor of Magnesia.

Theocracy, *The ok' ra sy*, a form of government in which God is recognized as the sovereign, and the laws are given by divine authority. The best illustration of a theocracy is that offered by the Hebrew nation from their exodus from Egypt to the choosing of a king.

Theocritus, *The ok' ri tus*, (about 310-about 245 B. C.), a Greek poet, born probably in Syracuse, Sicily. Cos, where he spent a great part of his time, is also thought by some to have been his birthplace. He visited eastern Greece and Alexandria (at the court of Ptolemy Philadelphus). About 31 poems and a number of epigrams are now extant and attributed to his name. He broke with the artificial period in which he lived and wrote poetry characterized by simplicity and love of nature. With dramatic insight he portrayed shepherds, fishermen and peasants that have a true existence and genuine fidelity to life.

Theod'olite, an instrument for measuring vertical and horizontal angles by means of a telescope whose movements are graduated and can be determined accurately. This instrument is constructed in various forms. The theodolite is used where great accuracy is required, chiefly in geodetic work, and consists of a telescope with a graduated, vertical, circular scale attached and provided with trunnions, two horizontal, circular plates turning freely on and concentric to each other, and two spirit levels on the top plates, the whole being mounted on a tripod. The bottom plate contains the graduations of a circular scale, while the top plate contains two vernier divisions diametrically opposite. Both plates turn on a vertical axis. In order to measure horizontal angles, the telescope is

brought to bear upon one object and then turned around along with the vernier scale to bear upon the other, whose distance is sought, and the arc which the vernier has described on the graduated, circular scale gives the angle required. The graduated vertical scale is employed for obtaining vertical angles in a similar manner. See GEODESY; SURVEYING; TRANSIT.

Theod'oric (about 454-526), King of the Ostrogoths and son of Theudemir, born in Pannonia. He was reared in the court at Constantinople, where from his 8th to his 18th year he was a hostage, and he acquired the refinement of the East. In 474 he succeeded his father as King of Pannonia, and after several years of strife offered to expel Odoacer, King of Italy, and his barbarians, from Italy. Having vanquished Odoacer, who was subsequently murdered at a banquet, in 493, Theodoric was proclaimed sole ruler, and the orderly government which he proceeded to establish endured for about 60 years. He won the sympathy of his soldiers by distributing a third of Italy among them, and he placated the Italians by his justice. During his reign of 33 years literature, art, agriculture and the industries revived, and among other numerous achievements, he adorned Ravenna, his capital, with beautiful buildings, ruins of some of which may still be seen. Theodoric was an Arian, but he allowed the orthodox Romans perfect freedom in their theological belief. He is known in history as Theodoric the Great.

Theodosius, *The" o do' shi us*, (about 346-395), a Roman emperor, called the Great. He was selected by Gratian in 379 to be his partner in the empire, with care of Thrace and the provinces in the East. On the death of Gratian, Theodosius succeeded to the real authority in the West, the young Valentinian occupying the throne only in name. In 392 Theodosius became sole emperor, marking the last real union of the whole empire under one ruler. He destroyed the great Temple of Serapis and issued an edict against the pagan worship alto-

gether. To punish him for causing the massacre of 7000 Thessalonians, St. Ambrose, Bishop of Milan, refused the Emperor communion for eight months and forced him to take off his royal robes and enter the Church as a penitent begging the mercy of God, before he would grant him absolution. At his death the eastern portion of the empire was left to his son Arcadius; the western portion to his son Honorius.

Theol'ogy, in its broadest significance, the science of religion, but in the more restricted sense in which the term is generally used it means the science of Christianity. Formerly a distinction was made between natural theology, which included those facts that can be ascertained without revelation, and revealed theology, which depends for its facts upon revelation and which deals with scientific interpretation of the Bible. This distinction is no longer regarded as important, and theology is classified as systematic theology or the science of Christianity, and practical theology, which treats of the application of theology to life through the administration of church affairs and the pulpit.

Theophrastus, *The" o fras' tus*, (about 372-287 B. C.), a Greek philosopher, belonging to the Peripatetic School, born in Lesbos. He studied philosophy at Athens, first under Plato and then under Aristotle. The latter, at his death, made Theophrastus head of the Peripatetic School of philosophy (See ARISTOTLE). This position he occupied for 35 years, enjoying a high reputation at home and abroad.

Theosophy, *The os' o fy*, (from Greek *theos*, god, and *sophia*, wisdom), a term used to denote a system of philosophic and religious thought based on the claim of an inward, mystic, supersensuous knowledge of God and divine things. It starts with the divine essence and from this deduces the laws and the activities of the universe. It is therefore opposed to all systems of empiricism or attempts to gain knowledge of God through the observation and analysis of phenomena. God is transcendent, independent of the

world. Theosophy represents a body of tradition that has come down from very early times. Among the Orientals it has been especially influential in China, India and Egypt. In the West it appears in the ancient speculations of Gnosticism, Neo-Platonism and the Cabalists; and later, in the systems of Boehme, Eckhart, Schelling and various religious and mystical orders.

In recent years theosophy has almost become identified with the teachings of Mme. Helena Petrovna Blavatsky, whose book, *The Secret Doctrine*, is regarded as authority on the subject. Her three fundamental positions are briefly as follows: (1) an omnipresent, eternal, boundless principle beyond human comprehension and expression; (2) the eternity of the universe; (3) the fundamental identity of all souls with the universal Over-Soul. With the aid of Col. H. S. Olcott and others, she founded the Theosophical Society in 1875, for the purpose of diffusing information concerning the secret laws of nature and extending the influence of theosophy.

Therapeutics, *Ther" a pu' tiks*, that branch of medical science concerned with the treatment of disease. Rational, or scientific, therapeutics implies a knowledge of disease and of the physiological action of drugs or other remedial agents based upon cumulative experience resulting from experiments on man and the lower animals. Such a knowledge includes an understanding of the effects of drugs upon the nervous system, heart, respiration and body temperature. The most important step in the treatment of disease is diagnosis, or ascertaining the disease. If the diagnosis is undetermined, the physician is at a loss to prescribe a remedy, but given an accurate diagnosis, the treatment of many diseases is a fairly simple matter. A remedy which has power to cure positively a certain disease is called a specific.

The term *therapy* includes many forms of treatment in which drugs are not employed. Among these are radiotherapy, which treats with the X ray; natural therapeutics, a method which seeks to

heal by assisting natural agencies, such as light, air, rest and proper nourishment in the natural restoration of the body. In symptomatic therapeutics the symptoms are treated rather than the cause; mental therapeutics attempts to remove disease through mental suggestion; electrotherapeutics makes use of the curative powers of electricity. See MASSAGE; X RAY.

Ther'mal Springs, or Hot Springs, springs whose temperature is higher than that of the region in which they occur. The name is applied to springs of a temperature only a few degrees above freezing point when they occur in high altitudes, as well as to those in other localities in which the water reaches the boiling point. In some cases the heat is produced by chemical changes; but frequently it is from the same source as volcanic heat. The springs usually occur in the form of boiling pools, subject to intermittent eruption. Most thermal springs hold in solution a large amount of silica or chalk, which they deposit on the surface in formations sometimes of great beauty. Some thermal springs are famous for the medicinal properties of their waters, such as those at Hot Springs, Ark., and Hot Springs, S. D.

Ther'modynam'ics, that branch of physics which deals with the relations between thermal and mechanical energy, especially with reference to the laws governing the conversion of heat energy into mechanical energy. There are two fundamental laws of thermodynamics.

FIRST LAW. Whenever mechanical energy is converted into heat, or heat into mechanical energy, the ratio of the mechanical energy to the heat is constant. See MECHANICAL EQUIVALENT OF HEAT.

SECOND LAW. It is impossible for a self-acting machine, unaided by some external agency, to convey heat from one body to another at a higher temperature. Put in other words, heat of itself never passes from one body to another at a higher temperature; and if by any means we cause heat to be transferred from one body to another at a higher

temperature, we must in the process supply the system with energy from some outside source. Thus, in a plant making artificial ice, heat is taken from the cold brine and transferred to the warmer outside air by the liquid and gaseous ammonia, but at the expense of the mechanical work required to operate the compressor pumps. On the other hand, in a hot-air engine using the same air over and over again in the cylinders, heat is transferred by this air from the source of heat supply to the water with which it is cooled, while being again compressed before reheating. And in this transfer, mechanical work is done at the expense of heat energy.

It is evident that in all heat engines, steam, gas and gasoline, much of the heat supplied escapes in the exhaust gases or in the condenser or cooler and is not converted into mechanical work. It is shown in works on thermodynamics that the greater the difference in temperature between the gas as it begins to expand in the cylinder and as it leaves the cylinder, the greater is the portion of the total heat supplied that is converted into mechanical work. In all forms of heat engines, it is theoretically possible to convert into mechanical work only a fraction of the total heat energy supplied. See HEAT, subhead *Temperature*.

For example, a condensing steam engine, in which the temperature of the steam supplied is 200°C . and the temperature of the steam exhausting into the condenser is 40°C ., cannot convert the 34 per cent of the heat energy contained in the live steam into mechanical work. By the time the losses in the furnace and boiler are allowed for, together with the losses in the engine by its not being able to do as well as this limiting fraction indicates, not much over 15 per cent or 20 per cent of the heat energy contained in the fuel is converted into mechanical work. Noncondensing steam engines do even more poorly than this, often converting less than eight per cent or ten per cent of the heat energy of the fuel into mechanical work. See STEAM ENGINE; GAS ENGINE.

Ther'moelectric'ity, that branch of electricity which deals with the production of electricity by the direct application of heat. If a bar of copper and a bar of iron in a circuit be soldered together and the joint be heated, a current will flow across from the copper to the iron. On the other hand, when a current is passed across the junction, it is cooled or heated according to the direction of the current. The different metals arranged in order, according to the electric potential difference developed in this manner, form what is known as a thermoelectric series. The principle is applied in a number of delicate instruments for measuring the heat radiated by distant bodies, and for determining the temperature of blast furnaces and retorts by means of radiation pyrometers. See THERMOPILE; PYROMETER.

Ther'mograph, a continuously recording thermometer. One form of thermograph used is a crescent-shaped bulb of metal filled with alcohol and hermetically sealed. A change in temperature causes the crescent-shaped bulb to change its form slightly and thus operate a system of levers by which the motion is greatly magnified. A pen carried on the end of the lever makes a trace on a ruled paper wound on a drum that revolves under the pen, the motion of the paper being at right angles to the motion of the pen. The paper is marked off in 24-hour divisions one way and degree temperature divisions the other way, so that one sheet contains one day's record. See THERMOMETER.

Thermom'eter, an instrument for indicating temperature. As commonly used it consists of a thick-walled glass tube containing mercury set vertically alongside a scale graduated in relation to the boiling and freezing points of water. The scale generally employed in England and the United States is that of Fahrenheit, in which the freezing point of water is indicated at 32° and the boiling point at 212° , but in many parts of Europe and for scientific purposes the Centigrade scale is used. This indicates the freezing point of water at

0° and the boiling point at 100° . Another scale is the Reaumur, in which the freezing point is at zero and the boiling point at 80° , but this is now little used.

In making these scales the tube containing the mercury is placed in boiling water, and the point to which the mercury rises is marked; afterwards it is placed in melted ice, and the point to which the mercury shrinks is also marked. From the freezing point at the lower end of the tube and the boiling point near the top are made the proper graduations in degrees to suit the scale chosen.

To change the Fahrenheit scale to degrees centigrade, subtract 32 from the number of degrees Fahrenheit, then multiply the remainder by $5/9$. To change centigrade to the Fahrenheit scale, multiply the number of degrees by $9/5$ and add 32. Degrees on all thermometers above zero are termed plus (+), and those below zero are termed minus (—). Since mercury freezes at 40° below zero and boils at 661° above, in the Fahrenheit scale, it cannot be used beyond these points. Alcohol colored red is used to fill a tube having a suitably graduated scale alongside it to make thermometers for low temperatures, while for high temperatures various forms of pyrometers are employed. See PYROMETER; THERMOGRAPH.

Ther'mopile, a collection of many strips of two different metals joined at their ends alternately one kind to the other, and so arranged that all the even-numbered junctions are close together and can be exposed to radiant heat from some source, while all the odd-numbered junctions are similarly grouped together and can be exposed to some surface kept at a fixed temperature. The first and last strips are connected to binding posts and thence by copper wires to a galvanometer or voltmeter. The junctions are coated with lamp-black or smoked with common soot so that they will absorb more completely all of the radiant heat that falls upon them.

When one set of junctions is exposed to radiant heat and thus warmed above the temperature of the other set of junctions, a small electromotive force is set up and a current of electricity flows in the galvanometer, the strength of the current depending upon the difference in temperature of the two sets of junctions and upon the electrical resistance of the circuit.

Such thermopiles, usually made of strips of bismuth and antimony, are used for the measurement of radiant heat and high temperatures, as in certain forms of electrical thermometers and radiation pyrometers. They are also used for the measurement of very small differences of temperature, as required in certain scientific work. See THERMOELECTRICITY; THERMOMETER; PYROMETER.

Thermopylæ, Battle of (480 B. C.), an important battle in the third Persian attack of Greece. In the mountains separating northern from central Greece, between the mountains and the sea, was the narrow Pass of Thermopylæ. This passage was only about 50 ft. wide and was the strategic point in the second line of defense of the Greeks. The Greek fleet of 270 ships was stationed near by, while the pass was held by about 7000 allied Greeks under the command of Leonidas, King of Sparta. On the ground of a religious festival the Spartans had sent only 300 soldiers to support their king. The battle continued for three days on land and sea. The Persians lost 400 ships in a storm, and their fleet was checked by the Greek fleet in the Battle of Artemisium. On the third night a traitor led a company of Persians over a secret mountain path which led to the rear of the Greeks and which had been carelessly left unguarded. The allies retreated, but Leonidas and his 300 men, true to Spartan training of never showing their backs to the foe, died fighting the enemy.

Ther'mos Bottle, a bottle designed to preserve for a long time the temperature of liquids placed in it. The name is derived from the Greek word *thermos*, meaning heat. The thermos

bottle consists of two glass bottles, one within the other, with an air space between them. The bottles are sealed together at the neck and the inner one is held firmly in its position by asbestos supports. The air is exhausted from the space between the bottles, and the vacuum thus formed, being a nonconductor of heat, preserves the temperature of the contents of the bottle. Those bottles which constitute the *filler* are enclosed in a metal case fitted with a cap, which can be used as a cup. A thermos bottle will keep boiling liquids hot for 24 hours and ice-cold liquids cold for three days. The bottles are made in pint and quart sizes.

Theseus, The'sus, in myths, an Athenian king, son of Ægeus. Reared to manhood in the palace of his maternal grandfather, Theseus then journeyed to Athens, where he was received as royal heir. Just at that time Athens was delivering to Crete a yearly tribute of seven maids and youths. These were devoured by the Minotaur, which Theseus determined to kill. With this resolve, he left for Crete, a voluntary tribute, in a mourning boat with black sails, which he promised to change for white if he returned in it a victor. He killed the monster with the aid of Ariadne, daughter of the King of Crete, whom he married but soon deserted. Returning home, he forgot to hoist white sails. Ægeus, on the lookout for his son, saw the mourning sails and, believing his boy to be dead, cast himself into the sea. Theseus then became a model and an idolized king, whom the Athenians worshiped after his death as a divinity. See ARIADNE.

Thes'pis, a Greek poet, called the father of Greek tragedy. He lived in the sixth century B. C., at the time of Solon, and was a native of Attica. Thespi is chiefly remembered for his addition of an actor to the choruses of the feats of Bacchus. This actor generally recited a mythical story when the chorus was silent, and carried on dialogues with the leader of the chorus. See DRAMA.

Thes''salo'nians, Epistles to the. See PAULINE EPISTLES.

Thes'saly, the northeastern and largest division of ancient Greece, bounded by Macedonia, Epirus, the Ægean Sea, the Ceta Mountains and the Maliac Gulf. Mountains enclose its fertile plains on every side, and it is thought that Thessaly was once a lake discharging through the Vale of Tempe as an outlet. The horses of Thessaly were once famous; the cattle and crops are still of excellent quality. Philip of Macedon conquered Thessaly in the fourth century B. C., and after remaining under Macedonian control for some time it fell in the hands of the Romans. It was made a separate province under Constantine, came under the power of the Venetians in 1204 and was conquered by the Turks in the 14th century. In 1881 the greater part of the territory was ceded to Greece.

Thet'ford Mines, a city of Canada in the Province of Quebec, on the Quebec Central Railway, 76 m. s. of Quebec. The leading industries include asbestos mining, the preparation of aerated waters, founding, tanning and the manufacture of sash and doors, cement blocks and overalls. Pop., 1921 census, 7,886.

Thian Shan, Te'' ahn' Shahn', or **Tian Shan**, a mountain system of central Asia, forming a part of the boundary between Russian and Chinese Turkestan. The main range extends north-eastward from the Plateau of Pamir until it is lost in the Desert of Gobi. Minor ranges extend in nearly all directions and enclose numerous valleys and steppes. The altitude ranges from 15,000 to 20,000 ft., and the highest summit is estimated to attain a height of 24,000 ft. The summits are covered with snow and many large glaciers are found. The lower slopes are heavily forested.

Thiers, Te air', Louis Adolphe (1797-1877, French historian and first president of the Third French Republic, born at Marseilles. At the age of 23 he left Marseilles for Paris, where his work in journalism and literature attracted attention. He started a paper in oppo-

sition to the government, called the *National*, which helped to bring about the Revolution of 1830 that led to the fall of Charles X. He then became a member of the Chamber of Deputies and was selected premier in 1836, but soon resigned because the King refused to approve of his plan of intervention in Spain. He was recalled again in 1840, but again resigned when Mehemet Ali was driven out of Syria. His opposition to the ambitious plans of Napoleon III led to his banishment in 1851, but he reentered the Chamber of Deputies in 1863 and opposed the war of 1870. After the war Thiers was placed at the head of the provisional government, and was elected president of the new republic in 1871. He put down the popular rising, known as the Commune, and through his wise and energetic measures France astonished the world by her rapid payment of the indemnity of the Franco-German War. Thiers was intensely patriotic. In government he believed that the power should be in the hands of the middle class. His chief historical works are *A History of the French Revolution* and *A History of the Consulate and the Empire*.

Thirty Tyrants, a body of rulers who were given sovereign power in Athens at the close of the Peloponnesian War, 404 B. C. They were appointed by the Spartans who hoped by this means to rule the city. Their rule was a reign of terror and lasted only a year.

Thirty Years' War (1618-1648), a war beginning in Germany between Catholics and Protestants and later involving nearly all Europe. In 1608 the Protestant princes formed a Union and a year later the Catholics joined in a League. In 1618 the Bohemian Protestants rebelled because certain privileges had been taken from them. They were led by Frederick V, the Elector Palatine, who met a crushing defeat at White Hill, near Prague, by the Catholics under Maximilian of Bavaria. Frederick was forced to flee and Protestantism was then stamped out in Bohemia.

The harshness of Emperor Ferdinand aroused the Protestant princes of Germany and they rallied under Count Mansfeld and other nobles. Christian IV of Denmark soon joined the Protestants. The nobles were defeated by Wallenstein and Tilly, and in 1629, at the Peace of Lübeck, Christian was glad to promise not to interfere again in Germany on condition that he would recover all the Danish territory which the imperial troops had gained and devastated.

THE SWEDISH PERIOD. The war in Germany was prolonged by the Edict of Restitution by which all Church property which had been confiscated by Protestants since 1552 was to be given back to the Church. This aroused such opposition that the Emperor was obliged to keep his army in the field. He yielded to the popular clamor against Wallenstein and placed Tilly in command. Gustavus Adolphus of Sweden now came to the aid of the Protestants, and the Protestant princes accepted his help after the siege of Magdeburg. Gustavus Adolphus completely defeated Tilly at Breitenfeld in 1631. Tilly died of a wound received in a later engagement and Wallenstein was again in command of the imperial troops. In 1632 the Swedes defeated him at the Battle of Lützen, but their gallant leader was slain.

THE FRENCH PERIOD. After the death of Gustavus Adolphus the Swedes carried on the war in as brutal a manner as Wallenstein. Both parties were weary of the conflict and peace seemed about to be concluded when Richelieu, to abase the House of Hapsburg, helped the Protestant princes and prolonged the war ten years. At last, after the country had been ravaged and the peasants had become so discouraged that they had no heart to plant the crop they so rarely reaped, peace was declared by the Treaty of Westphalia. This established equality between the Calvinist, Lutheran and Catholic princes of Germany, while every prince was given the right to make his religion the religion of his people; the states of the empire be-

came almost independent; Sweden received territory in northern Germany; Alsace was given to France; and the independence of Holland and Switzerland was recognized. This treaty was the basis of nearly all European treaties until the French Revolution, and marks the end of the religious wars in Europe.

Thistle, *This' 'l*, a familiar class of weeds of the Composite Family known by their coarse, prickly foliage and bulging heads of flowers. There are many species in the United States, some native and some immigrants from the Old World. They have tough, fibrous stems somewhat angled or grooved and varying in height according to the species. The leaves are much-divided and end in spiny prickles. The flowers are enclosed in a coarse, woolly case, green on the outside and covered with spreading spines. These are almost globular in form and are noticeably pretty when the yellow, red, magenta or purple, downy flowers come bursting through their summits. The flowers are soft and silky and are surrounded by fine hairs. After the flowers are withered the heads become big, downy balls whose seeds are blown about easily in their tiny parachutes. The Canada thistle is the most obnoxious to the farmer, being the hardest to exterminate.

The sturdy hardiness of the thistle, its bright blossoms and its ready defense against those who would injure it, caused it to be chosen the national emblem of Scotland. The Russian thistle is a foreign member of the Goosefoot Family which has gained entrance to the United States and has become a troublesome weed in the Southwestern States. It is there also known as the Russian tumbleweed.

Thistle Bird. See **GOLDFINCH.**

Thomas, *Tom' as*, one of the Lord's Twelve Apostles, of whom little is known. He is especially remembered as the "doubting" apostle, who would not believe the story of the Resurrection until he had seen the risen Lord personally. Thomas's faith was further confirmed when Christ appeared to the

group at the Sea of Tiberias (*John xxi, 2*).

Thomas, George Henry (1816-1870), an American soldier, born in Southampton County, Va., and educated at West Point. He took part in the Seminole and Mexican wars, instructed in artillery at West Point, and in 1855 again entered active service against the Indians of Texas. At the outbreak of the Civil War he became brigadier-general of volunteers, and, while commanding a division of the Army of the Ohio, he defeated the Confederates at Mill Springs. He had important commands at Corinth and Perryville, and as major-general of volunteers rendered eminent service in the battles of Murfreesboro and Chickamauga. At the latter engagement, in September, 1863, by saving the Federal army from what seemed complete destruction, he won the sobriquet of the "Rock of Chickamauga." The following month he was given command of the Army of the Cumberland and had charge at Missionary Ridge, and in the Atlanta campaign of the following year he stationed himself at Nashville and defended Tennessee against Hood. For this he was promoted major-general in the regular army. Following the war he declined the brevet of lieutenant-general offered him by President Johnson.

Thomas, Theodore (1835-1905), a distinguished American orchestral conductor, born at Esens, Germany. He received his musical training under his father and at the age of ten years came with his parents to America. His first position was that of first violin of an orchestra, but in 1861 he organized an orchestra of his own in New York City, with which he later made tours to various cities of the United States and Canada. He was closely identified with most of the important musical movements in the United States for 40 years, and was conductor at different periods of the New York Philharmonic Society, the Brooklyn Philharmonic Society, the American Opera Company, director of the Cincinnati College of Music, and for

more than 30 years conductor of the biennial May festivals at Cincinnati. In 1891 he removed to Chicago and organized the Chicago Orchestra, which he conducted up to the time of his death, and which has become one of the most prominent permanent institutions of that city. The name was changed to the Theodore Thomas Orchestra in honor of its founder soon after his death, but in 1913 it was changed to the Chicago Symphony Orchestra.

Thomas à Kempis (about 1380-1471), a monk universally known by his book *Imitation of Christ*, which is said to have been more widely read than any other religious book except the Bible. He was born at Kempen in the Lower Rhine District and was educated at Deventer and by the Brothers of the Common Life. At the age of 20 he entered the Augustinian convent of Mount St. Agnes, where nearly all his life was passed.

Thompson, Tomp' sun, Denman (1833-1911), an American actor, born in Erie County, Pa. He passed much of his boyhood in Swanzey, N. H., where he met some of the types which he subsequently made famous. He early joined a circus as tumbler, and in 1852 made his stage début at Lowell, Mass. His *Joshua Whitcomb* first appeared in Pittsburgh in 1875. In 1886 he enlarged it into *The Old Homestead*, which presents the same character. It formed the basis of his future popularity and vast fortune and is the best drama of its kind.

Thompson, James Maurice (1844-1901), an American novelist, poet and journalist, born in Fairfield, Ind. His father was a Georgia planter and a part of his education was received under private tutors. He served in the Confederate army and after the war became a civil engineer and practiced law in Crawfordsville, Ind. In 1879 he was elected to the State Legislature, and was state geologist from 1885 to 1889. He joined the editorial staff of *The Independent* after his removal to New York in 1890. He was well versed in French literature, interesting in conversation

and a lover of nature. His writings possess notable impressionistic touches. They include *Hoosier Mosaics*, *A Tallahassee Girl*, *Witchery of Archery*, *Boys' Book of Sport*, *A Fortnight of Folly*, *Alice of Old Vincennes*, *King of Honey Island*, *My Winter Garden*, *At Love's Extremes*, *Sweetheart Manette* and *Milly*.

Thomson, Tom' sun, James (1700-1748), a Scottish poet, born at Ednam, in Roxburghshire. He went to London in 1725 to seek his fortunes, and the following year appeared his poem *Winter*, the first of the group to which he gave the title of *The Seasons*. *Summer* was published in 1727, *Spring* the following year and *Autumn*, which completed the series, in 1730. He traveled in France and Italy as private tutor to the son of Sir Charles Talbot. In 1748 he published *The Castle of Indolence*. The real distinction of his work lies in the fact that he was an originator, and that he became a forerunner of the Romantic movement that was to find its noblest expression in the poetry of Wordsworth and his contemporaries. He substituted blank verse for the heroic couplet and revived the long-neglected Spenserian stanza. He also published *The Masque of Alfred*, containing the song *Rule Britannia*; *Edward and Eleanora* and *Agamemnon*.

Thomson, Sir William, LORD KELVIN (1824-1907), a celebrated mathematician and physicist, born at Belfast. In 1845 he graduated from St. Peter's College, Cambridge, where he was shortly elected a fellow, and from 1846 to 1899 he was professor of natural philosophy in the University of Glasgow. For some time he was editor of the *Cambridge and Dublin Mathematical Journal*, wherein some of his most brilliant discoveries appeared. He also contributed to the *Philosophic Magazine*. In the mathematical theories of elasticity, vortex-motion, heat, electricity and magnetism, he made some remarkable discoveries; but it is in his capacity of electrical engineer for the Atlantic cables of 1857 and 1865 that Sir William Thomson is most gen-

erally remembered. He improved signaling apparatus, invented the mirror galvanometer used for cable signaling, and then developed the siphon recorder for receiving the signals; furthermore he developed an improved mariner's compass and a deep-sea sounding apparatus.

His paper *On An Absolute Thermometric Scale* contains considerable of what is fundamental in thermodynamics. His many scientific papers have been collected in book form, there being one volume entitled *Electrostatics and Magnetism*, three volumes called *Mathematical and Physical Papers* and three more known as *Popular Lectures and Ad-*



THOR

resses. With Professor Tait he was author of the well-known *A Treatise on Natural Philosophy*. Sir Thomson was the recipient of many high honors, and belonged to the most important learned organizations of Europe and America. He visited America in 1884, 1897 and 1902, during his first trip delivering a course of lectures at Johns Hopkins University. For his services in connection with the Atlantic cable he was knighted in 1866, and he was raised to

the peerage in 1892. He represented the highest type of physicist, combining mathematical reasoning with the experimentalist's inventive and manipulative ability.

Thor, in Scandinavian myths, the most powerful god, the thunderer, son of Odin. He owned a hammer which magically returned to his hand, when thrown, a pair of iron gauntlets and a belt of strength. Lest he set it on fire, he alone could not travel to earth on the rainbow bridge, which the other gods used. A benevolent deity, he was the special patron of peasants. The word *Thursday* means Thor's day.

Thoracic, *Tho ras' ik*, **Duct**, the largest lymphatic vessel in the human body. It consists of three coats and contains transverse valves, which occur at intervals throughout its length and prevent a backward flow of its contents. It is about one-eighth of an inch in diameter, and extends from the upper part of the abdominal cavity along the left side of the spinal column to the seventh cervical vertebra, where it empties the lymph, which it has gathered from its tributary lymphatic vessels (of the intestines, lower extremities, left arm and left side of the head), into the left subclavian vein.

Thoreau, *Tho' ro*, **Henry David** (1817-1862), an American naturalist and author, born at Concord, Mass. For a short time he worked at his father's trade of manufacturing lead pencils, and later he attempted school teaching with indifferent success. In 1845 he selected a site on the shores of Walden Pond, not far from Concord, where he built a hut and withdrew to prove to the world how simply and pleasantly man can live in solitude and seclusion. Here he studied nature and labored sufficiently at carpentering and gardening to eke out an existence, and nothing more. His expenses are said to have averaged about ten cents per day.

Thoreau was wont to speculate on philosophical problems, and became a devoted friend and admirer of Emerson. His knowledge of foreign classical literature was wide by reason of his con-

stant reading. He kept a journal from 1837 until his death, and this is the chief source from which we gain an intimate knowledge of this recluse, with his strange ways of thinking and living. There is a breath of freshness and a whiff of the woodlands pervading all he wrote, and his style possesses genuine literary qualities. He observed nature minutely and mingled speculation and philosophy with acute details and happy descriptions. His works include *Familiar Letters; A Week on the Concord and Merrimac Rivers; Walden, or, Life in the Woods; Excursions; The Maine Woods; Cape Cod; Early Spring in Massachusetts; Summer; Winter; Autumn*; and his *Journal*.

Tho'rium, a metal discovered by Berzelius in 1828. It is found in North Carolina and Norway and is obtained by decomposing thorium chloride with potassium or sodium, when it appears as a gray powder. It is about 11 times heavier than water and takes an iron-gray polish. The dioxide is used in the manufacture of Welsbach mantels.

Thoroughwort, *Thur' o wurt'*. See **BONASET**.

Thorwaldsen, *Taur' wauld sen*, **Bertel** (1770-1844), an eminent Danish sculptor, born at Copenhagen, the son of a carpenter and wood carver. When a mere lad he began to assist his father, and his talent for carving soon attracted attention. At the age of 11 he entered an art school in Copenhagen. In 1793 he won the highest prize and four years later went to Rome, where he remained for 23 years. His first great success was a statue of Jason, which received the highest commendation and at once made him famous. Following the execution of this statue, orders poured in upon him faster than he could execute them. His greatest skill was in reliefs, many of which included mythological characters and scenes. All are of remarkable beauty. In 1819 he returned to Denmark and was received at Copenhagen with the highest honors. While there he was commissioned to make the colossal series of statues of Christ and the

Twelve Apostles for the Church of our Lady. He returned to Rome to execute the commission. His statue of Christ in this group is one of his most famous works. On completion of the series Thorwaldsen returned to Copenhagen, where he spent most of his remaining years and where he suddenly died in the theater. Another of his widely known works is the *Lion of Lucerne*, modeled by him and carved out of the living rock by the Swiss sculptor, Ahorn.

Thorwaldsen is considered the most successful imitator of classic sculpture, and many of his pieces show a genius equal to that of the ancient Greeks. He left a large part of his fortune to establish a museum in Copenhagen, where models of his works have been placed and in whose central court his remains are buried.

Thothmes *Thoth' meez*, the name of four kings of Egypt of the 18th dynasty. Thothmes I began his reign about 1560 B. C. He conquered the Nubians and invaded Asia as far as the Euphrates. He built two pylons, two hypostyle halls and two obelisks at Karnak, one of which is still standing. The reign of Thothmes II was of no significance. Thothmes III was one of the greatest if not the greatest of all Egyptian monarchs. He came to the throne about 1538 B. C. and reigned for 54 years. During the first part of his reign his aunt, Hatshepsut, was coregent with him. When he became sole ruler about 1516 B. C. Thothmes entered upon a career of conquest unparalleled in Egyptian history. He subdued the Syrians and other Asiatic nations, making them tributary to Egypt, and extended his conquests into the northern part of Palestine and eastward to the Euphrates. His building operations equaled his conquests in magnitude and magnificence. He made important additions to the great temple at Karnak and erected magnificent temples at Abydos, Heliopolis, Edfu and other places. One of the obelisks erected by him is now in Central Park, New York; another stands on the Thames embankment in London.

Thought, *Thot*, the mental concentration upon ideas rather than upon emotions. It involves three processes: the forming of concepts; the comparison of concepts, known as judging; and the comparison of judgments, known as reasoning. The three steps are often performed almost simultaneously. It is by means of thought that man is enabled to avoid dangers and to accept pleasures. A child burned at the stove avoids all dark, metallic objects; later he realizes the difference between stoves and other similar objects, and he has begun to think. When he can distinguish between the stove with a fire in it and without, he has carried the process still further. Because man possesses this ability, though he is weaker than many of the animals about him, he is able to conquer the animal world and even use the elements for his purposes. Shut off from one resource, he finds another to replace it; removed from his natural surroundings he adapts himself to the new; but a beaver shut in a dry room, still builds his dam though the need for it is gone. Man, too, is capable of great improvement. Since the days of the cave man, his manner of living has marvelously changed, but the bird builds today practically the same nest as did its ancestors of centuries ago.

Thinking, to a slight extent, is carried on early in life, but is fully made use of only as maturity approaches. It is in its highest vigor, however, when memory and the other conscious states are beginning to decline.

Thousand Islands, a group of islands in the St. Lawrence River beginning where the river emerges from Lake Ontario and continuing for nearly 50 m. There are in all about 1500 islands. The region is a noted summer resort, and most of the islands are owned by private individuals who have erected beautiful summer villas upon them.

Thrace, a name applied by the ancient Greeks to an indefinite region north of Macedonia and extending to the Hellespont. Sestus, celebrated in the story of Hero and Leander, and Byzantium

were places within the region of special note.

Thrashing Machine, or Thrasher, a machine for separating grain from its straw and chaff. It is used in thrashing wheat, oats, rye, barley and rice. Grain was at first thrashed by beating with a stick; later it was trodden out by animals, especially oxen, which were driven over a thrashing floor upon which a thin layer of the unthrashed grain was spread. Later a sledge consisting of rollers was used in place of the animals. Following the sledge came the flail, a hand implement consisting of two sticks, the longer of which, constituting the handle, was about one and one-fourth inches in diameter; the other was about two and one-half inches in diameter and about three feet long. This was fastened to the upper end of the handle by a thong in such a manner that it could swing in all directions. It struck forcibly on the grain, which was spread in a thin layer on a wooden floor.

In 1786, Andrew Meikle, a Scotchman, produced the first successful thrasher. Since that time many changes and improvements have been made. A thrashing machine consists essentially of a cylinder or drum, provided with steel teeth arranged in rows and operating when revolved against a concave which conforms to its circumferential shape, and which is provided with similar steel teeth that mesh with those in the cylinder. In order to complete the separation, a shaker, consisting of a number of inclined screens with a fan, is added, besides an endless belt to carry off the straw and a small elevator to convey the grain into sacks. In the improved wheat thrashers there is a self-feeding apparatus usually provided with a cutting device to cut the wires or the twine that binds the sheaves of wheat. A so-called wind stacker, consisting of a long sheet-iron tube with its base in a revolving frame connected to an exhaust fan, is employed to stack the straw in windy weather. Thrashers are made portable by mounting them on trucks; they are now generally of large capacity, from

1500 to 2000 bushels of wheat a day, and are usually driven by portable engines operated by steam or gasoline. See **WHEAT**.

Thread, Thred, a small cord made by twisting together fibers or several fine yarns and used principally for sewing. Thread made from the natural fibers of flax, hemp and palm leaves has been used since the days of antiquity. Thread is now made chiefly from long-fiber cotton, the fiber of flax and from silk. Cotton thread, on account of its cheapness, is the most extensively used in sewing. The cotton is first cleaned and picked, then combed by carding machines, after which it is fed into drawing frames in which a series of rollers causes the cotton to be drawn into ribbonlike forms. These are then taken to another frame and doubled and compressed into strips, which are again carded, spun into yarn and wound on bobbins. Finally these yarns are twisted together to form thread. Three double yarns are required for six-cord thread and three single yarns for three-cord thread. If the thread is to be white it is bleached; otherwise it is dyed.

Formerly thread was sold in hanks, carefully tied to prevent tangling, but now thread is generally run on wooden spools and marked according to size with a number, 300 being a very fine thread, while number eight is an exceedingly coarse one. Linen thread is stronger than cotton, and is sometimes put up in hanks, as is also the finer silk thread, called floss, and used for embroidery. The value of the thread produced in the United States amounts to over \$2,000,000 yearly. England controls the foreign trade.

Three Rivers, a city of Canada in the Province of Quebec, capital of St. Maurice County, situated at the confluence of the St. Maurice and St. Lawrence rivers, on the Canadian Pacific and Grand Trunk railways, 92 m. n.e. of Montreal. The lumber trade is extensive, and the other industries include the manufacture of furniture, machinery, boots, shoes and paper. Grain,

THRUSH

lumber and cattle are shipped to South America, England, the United States and the West Indies. Three Rivers is one of the oldest towns in Canada. It was almost destroyed by fire in 1908, but was soon rebuilt. Pop., 1921 census, 22,367.

Thrush, a family of birds which includes some of the finest songsters of America, among them being the robin, the bluebird and a number of thrushes proper. The color is brown or olive-brown above, with spotted breasts. Over 150 species are known in the Eastern and Western hemispheres and 12 species are found in the United States. The thrushes are all migratory. The gray-cheeked thrush covers over 10,000 m. in a single season, nesting in Alaska near the Arctic Circle and wintering in Cuba and Central America.

WOOD THRUSH, or SONG THRUSH. This is one of the most familiar and characteristic of the thrushes. Its song, though not equal to that of the hermit thrush, is still among the most beautiful of those of any feathered songsters, its liquid sweetness reminding one of a flute. The song is most frequently heard in morning and evening and usually comes from the depths of the woods where the bird likes to shield itself. The nest of the wood thrush resembles that of the robin. Three to five greenish-blue eggs are laid and are hatched in 12 days. The young leave the nest in ten days. While sitting, the wood thrush permits a close approach to the nest.

HERMIT THRUSH, or SWAMP ANGEL. This thrush is olive or reddish-brown above, buff underneath and shaded with olive on the sides. The throat and breast are marked with olive spots. Its length is from six and one-half to seven and one-half inches. The song equals that of the nightingale. It is found in the United States from New England to Florida. It prefers solitude and lives almost wholly in the deep woods, from which its song, similar to that of the wood thrush, is heard. The nest is usually placed on the ground or very near it and is made of bark and leaves. The eggs are plain greenish-blue.

THUNDERSTORM

WILSON'S THRUSH, or VEERY. This thrush is light reddish-brown above and white beneath, shaded with buff on the breast and olive spots on the sides. Its length is from six and one-half to seven and three-quarters inches. It is common in Pennsylvania and New England during the summer and is found as far north as Labrador. The nest is built on the ground or near it and is made of leaves and grass and lined with fine roots. From three to five pale greenish-blue eggs are laid. It frequents the



HERMIT THRUSH

dark shaded borders of woods and brooks, from which its song is heard morning and evening.

Thucydides, *Thu sid' i deez*, (about 470-about 400 B. C.), an illustrious Greek historian, born in Attica. He possessed great wealth and was a prominent commander during the Peloponnesian War, until exiled by Cleon. His great history of the Peloponnesian War comprises eight books. It is painstaking and impartial, vivid, dignified and concise in style.

Thunder Pumper. See BITTERN.

Thunderstorm, a local atmospheric disturbance, so named because of the electrical phenomena which distinguish such storms. They occur chiefly in warm regions, that is, in low latitudes or in the summer season in middle latitudes, and over areas where there is considerable atmospheric moisture, usually on the warmest days and at the hottest time of

the day. There are, however, exceptions to this general rule, and violent thunderstorms often occur at night, in winter and in very high latitudes. The area affected by one of these storms is approximately circular in shape. The condition necessary for the formation of a thunderstorm is unstable equilibrium of the atmosphere caused by unequal heating. When there is a general circulation of the atmosphere, the warm surface air and the cooler air above are mixed; but during a temporary calm the surface air grows hotter and hotter until released by a whiff from somewhere without the heated area.

The hot air then rises rapidly, and the surrounding cooler air flows in to take its place, causing a strong up-draught. When the warm, moist air reaches the elevation where the temperature is at dew point, condensation takes place. This results in the formation of banks of cumulus clouds (See CLOUD). The rapid condensation of vapor in the air generates electricity, and each drop of water becomes charged. When the electricity is discharged from one cloud to another or from the clouds to the ground, lightning and thunder result, the noise being due to the air vibrations set up by the electrical discharge. Rolling thunder sometimes follows a succession of lightning flashes, or may be the reverberation caused by hills and other irregularities of the land. Frequently the lightning of far-distant electrical storms illuminates clouds overhanging a region from which the lightning itself is not visible. This reflection is called *heat lightning*. See LIGHTNING.

In middle latitudes thunderstorms usually move from west to east, while in the zone of the trade winds they move in the opposite direction, that is, with the prevailing winds. Their rate of progress is from 20 to 50 m. an hour. The first indication of a coming thunderstorm is a bank of cumulus clouds in the west, piled upon a horizontal base. As they approach the observer, they are preceded by a stiff breeze or squall. Then follows rain, or hail and rain, during the

fall of which the electrical disturbances are most violent and dangerous. After the passage of the storm, the air is usually fresher and cooler.

Thur'man, Allen Granbery (1813-1895), an American statesman and jurist, born in Virginia. Educated at the academy at Chillicothe, Ohio, he was admitted to the bar in 1835 and entered Congress nine years later, declining a second term. In 1851 he became associate justice of the Ohio Supreme Court and from 1854 was chief justice for two years. After being defeated for the governorship of Ohio, Thurman was twice United States senator, when he came to be known as the sturdy "Old Roman" of Ohio. He helped create the electoral commission in 1876, of which he was a member. In 1888 the Democrats selected him as Cleveland's running mate, but he was defeated.

Thursday, Thurs' day, the fifth day of the week, named from the old Scandinavian god of thunder, Thor, the Jupiter of the North. Ascension Day is often called Holy Thursday. See THOR.

Thwaites, Reuben Gold (1853-1913), American historian, born in Dorchester, Mass. He was educated in the public schools of that city, and took postgraduate work at Yale. In 1866 he moved to Wisconsin, and in 1876 he became editor of the *Wisconsin State Journal*, at Madison. In 1886 he was elected secretary of the Wisconsin State Historical Society. He was the editor of numerous books on historical and literary subjects; among these *The Jesuit Relations*, in 73 volumes, is considered to be a particularly scholarly work. Among his books may be mentioned *Down Historic Waterways*; *The Colonies, 1492 to 1750*; *The Story of Wisconsin*; and *On the Storied Ohio*. He also published several biographies.

Thyme, Time, a garden herb of the Mint Family, also found growing wild in dry, sunny countries, especially around the Mediterranean. Like all members of this family, the thyme has square, hairy stems; its leaves are also hairy and arranged in pairs, each pair grow-

ing at right angles to the pair beneath. The plant has a fragrance due to the presence of an aromatic oil in fruit, leaves and stems. The common thyme is a small, shrubby plant, generally growing in a straight or slightly bent position from one to two feet in height. The leaves are practically stemless; the flowers are small and grow in bunches on a spike, with generally six flowers to a bunch. This thyme is widely cultivated in European gardens for a flavor, for ornament or for the production of oil for perfume. Creeping thyme, or mother-of-thyme, is a more leafy variety cultivated to conceal waste places or unsightly objects. See THYMOL.

Thymol, *Ti' mol*, an organic compound derived from thyme oil. It is a colorless substance which crystallizes easily in long, thin plates. It has a burning taste and the well-known odor of thyme. Thymol melts easily and is acted upon by most acids. It is not soluble in water. Thymol is familiarly known as thyme camphor, and is used as an antiseptic. Chemically, it resembles carbolic acid in construction, although its physical properties are very different.

Ti'ber, a river of central Italy. It rises in the Tuscan Apennines, about 3600 ft. above sea level, winds its way south through the Province of Perugia, receiving several smaller streams, and passes through Rome, entering the Tyrrhenian Sea about 26 m. below the city. Its total length is 245 m. At Rome its breadth is about 250 ft. It is navigable by small steamers as far as Rome and by smaller vessels some 35 m. farther. The water is swift-running, and its yellowish color is caused by the alluvial matter which it carries. The inundations of the turbulent Tiber have been numerous, the most disastrous being the floods of 1598 and of 1900. Massive embankments have been constructed by the government, as a source of protection, but they have not proved wholly effective.

Tibe'rias, Sea of. See GALILEE, SEA OF.

Tibe'rius (42 B. C.-37 A. D.), second Emperor of Rome, son of Tiberius Claudius Nero and Livia Drusilla, later wife of Augustus. When 29 he became consul, later was adopted by Augustus and in 14 A. D. ascended the throne. Until the death of his mother in 29 A. D., he ruled as a tyrant, occasionally exhibiting great wisdom; but he then resigned his entire authority to Sejanus, the praetorian prefect, and retired to the Isle of Capri, where he abandoned himself to sensual indulgence. In the absence of Tiberius, Sejanus aspired to the throne, but fell a victim to this desire in 31. Though much disrepute is attached to the reign of Tiberius because of his misplaced confidence in the miscreant Sejanus, his government of the provinces was characterized by fairness and kindness. During his reign Christ was crucified.

Tibet', or **Thibet**, *Ti bet'*, a dependency of China lying between Turkestan and India. The country occupies a vast and lofty plateau having the Himalayas at its southern boundary and the Kuenlun Mountains on the north. The entire plateau is rough and rugged, with little vegetation, cold winters and hot dry summers. In the valleys some wheat, barley and vegetables are raised. Tibet is the home of the yak and wild sheep, and goats also live in the rocky heights. The people of Tibet are chiefly Buddhists and their political control is inseparably connected with their religion; the head of the Church, called the Dalai-Lama, is also the head of the State, and the laws of the land are given out from the monasteries. In general, the inhabitants are in poor circumstances and are unable to get their living from the land. Lhasa, the capital, is on the Brahmaputra River. The area of Tibet is 463,200 sq. m. Population, 2,000,000.

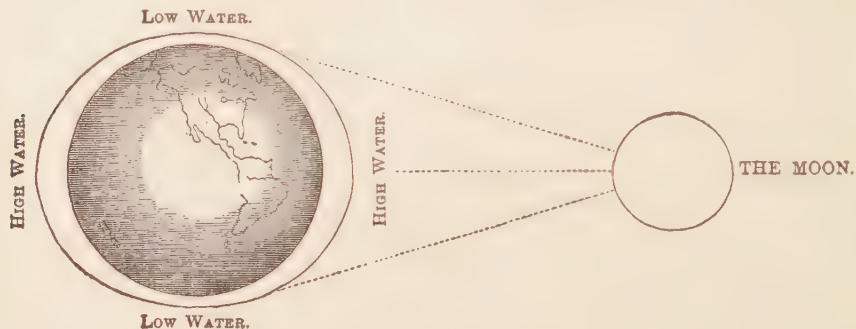
Tic Douloureaux, *Tik" Doo" loo roo'*. See NEURALGIA.

Tick, a tiny animal belonging to the same group, the Arachnida, as the spiders, mites and scorpions. The ticks are larger than the mites and are annoying creatures that attach themselves to man,

birds and many other animals to suck their blood. The young ticks have but six legs and so are often mistaken for insects, but the adults have eight legs. Some flies are wrongly called ticks, as the sheep tick, bat tick and bird tick. See SHEEP TICK; CATTLE TICK.

Ticonderoga, *Ti kon' der o' ga*, a fortress that was built near the head of

authority he demanded the surrender of the fort, whereupon was made the famous reply: "In the name of the Great Jehovah and the Continental Congress!" The position was easily regained by General Phillips, July 5, 1777, when St. Clair left it under cover of darkness, on the approach of Burgoyne's forces. It was subsequently abandoned by the



COMMON TIDE (FIGURE 1)

Lake Champlain in New York by the French in 1755. Two years later a large force of British under Abercrombie marched against it, but Montcalm, the French commander, compelled them to retreat. In 1759 it was captured by the British under Amherst after a protracted siege.

Some three weeks after the Battle of Lexington, an American expedition from the Green Mountains and the Connecti-

British only to be reoccupied in 1780. The ruined barracks and fortifications may still be seen.

Tides, the daily rising and falling of the waters of the oceans. Tides are produced by the attraction of the sun and moon, but chiefly by that of the moon. They occur approximately twice each day and are about 12 hours and 26 minutes apart, rising from a half hour to an hour later each day. The rising of the



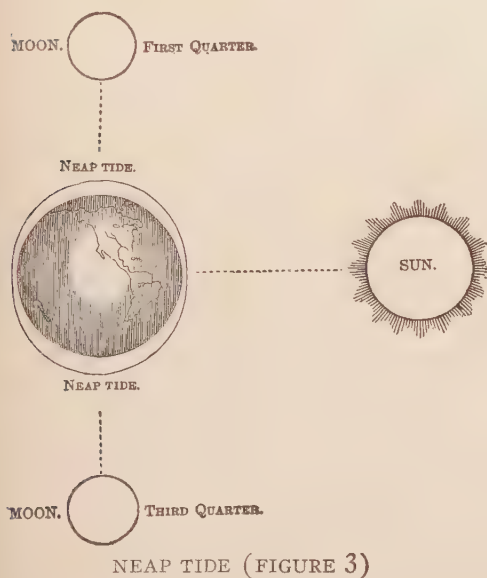
SPRING TIDE (FIGURE 2)

cut Valley, under Ethan Allen, and from western Massachusetts, under Benedict Arnold, advanced against the fortress at Ticonderoga. The leaders, with 83 men, surprised the position at daybreak, May 10, 1775, and it fell without a blow. The British commander, hardly awake, had confusedly inquired of Allen by what

water is called the flood tide, the falling, the ebb tide. High tide is called high water; and low tide, low water.

The sun and moon both attract the earth, but the moon is so much nearer the earth that it exerts the greater influence. The moon attracts the land and the water with equal force, but the ef-

fect upon the land is invisible. The effect upon the water, however, is to draw it up and form a wave, which theoretically is directly under the moon, but which in reality is always behind the moon. This retardation is due to the position of the continents and the irregular form of the bed of the ocean, and varies from less than an hour to several hours. Only in the open sea south of Africa and South America does the tidal wave move uniformly from east to west. Since ships take advantage of high water for entering and leaving port, England, France, Germany and the



United States have constructed tidal charts, which give the hours of high and low water for their respective harbors each day in the year. The height of the tide also varies from about 3 ft. in the open ocean to 10, 12 and even 60 ft. on the coast. This variation is due to the irregularities of the coast and the shape of the arm of the sea which the tidal wave enters. If it is V-shaped, the wave is shortened and consequently heightened as it proceeds; consequently estuaries and narrow inlets have high tides. At the head of the Bay of Fundy the rise sometimes is 60 ft. When the tidal

wave meets the current of a river in an estuary, its height is increased, and a dangerous wave, called bore, is formed. Bores occur in the Plata of South America and some of the larger rivers of China and India. It is everywhere dangerous to navigation.

THEORY OF TIDES. There are two places having high tide and two places having low tide at the same time. Theoretically the places of high tide should be on opposite sides of the earth, or 180° apart, and the places of low tide should be 180° apart and 90° from the places of high tide (Figure 1). The high tide on the side of the earth next the moon is easily accounted for, since it is the direct result of the attraction of the moon. Various theories have been advanced to account for the tide on the opposite side of the earth, but perhaps none is better or clearer than that advanced by Newton that the moon attracts the solid part of the earth with a greater intensity than it does the water on the opposite side. The earth is thus drawn away from the water, forming a high tide on the side away from the moon. The sun also causes tides, but they are so much lower than those caused by the moon that they are scarcely noticed.

SPRING AND NEAP TIDES. At the new and full moon the centers of the sun, earth and moon lie in the same straight line, and the combined attraction of the sun and moon causes higher water at high tide and lower water at low tide (Figure 2). These are known as spring tides. The highest spring tides occur in March and September at the time of the equinoxes. When the moon is in its first and third quarters, lines joining the centers of the three bodies would form a right angle (Figure 3). When in this position the attraction of the sun counteracts in a measure that of the moon, and this causes lower water at high tide and higher water at low tide. The tides at these periods are called neap tides. See GRAVITATION.

Tieck, Teek, Johann Ludwig (1773-1853), a German novelist, critic and translator, born in Berlin. He studied

at Halle, Göttingen and Erlangen, engaged in literary work at Berlin, and in 1799 went to Jena and joined in the Romantic agitation begun by Novalis and the Schlegels. After traveling in England, Italy and France, he became director of the Dresden Court Theater in 1825. On his return to Berlin in 1841 he entered on a period of rapid production which ended in a nervous breakdown, after which his work lost some of its mysticism, but gained in artistic finish and maturity. All his early writings are full of the "storm and stress" of the period, and rich in imagination and exuberance. He wrote *Abdallah*, *William Lovell*, three volumes of fairy tales, *The World Topsy-Turvy*, *Phantasien über die Kunst, Romantische Dichtungen und Dramaturgische Blätter*, and translated Cervantes' *Don Quixote*.

Tientsin, *Te en' tseen'*, the leading port of north China, an important railway center, a treaty port, and one of the capitals of the Province of Chihli, situated 70 miles southeast of Peiping (Peking), on the Peiho at its junction with the Grand Canal, and about 45 miles from the sea. It carries on an enormous trade with the interior and has a large foreign trade. The harbor is kept open in winter by powerful ice-breakers. The city has a number of cotton mills and distilling and salt-evaporation are large industries. Tientsin was opened to foreign trade in 1860 and seven foreign powers hold concessions here. After the Boxer Rebellion of 1900 the walls of the city were razed and many modern improvements were made, including paved streets, electric light, and sewerage systems. Disastrous floods occurred in 1917 and 1924 when the Grand Canal burst its banks. Population, 800,000.

Tierra del Fuego, *Tyer'rah del Fwa'go*, an archipelago off the extreme south end of South America, from which it is separated by the Strait of Magellan. It has an area of more than 27,000 square miles, of which the largest island, King Charles South Land, occupies four-fifths. The Andean Mountain

system is continued in several ranges through all the smaller islands and the west half of the main island. The islands are separated by deep and tortuous channels and have rugged coast lines. The climate is equable and the rainfall is greater than on the Patagonian plateau. Agriculture and cattle-raising are the chief occupations. The eastern half of King Charles South Land and the Isla de los Estados belong to Argentina, the remainder of the archipelago to Chile. It was discovered by Magellan in 1520. Native population (Fuegians) about 1,000; civilized population, about 2,500.

Tiffin, Ohio, a manufacturing and agricultural center and the county seat of Seneca County, 35 miles southeast of Toledo and 70 miles northwest of Columbus, on the Sandusky River and on the Baltimore & Ohio, the Pennsylvania, and the Big Four railroads. Extensive deposits of glass sand and clay are found in the vicinity. Tiffin has manufactories of tumblers and stemware, transmission machinery, pottery, bolt and nut machinery, canvas gloves, wooden handles, grinding wheels, washboards, cigars, metal novelties, church furniture, metal ceilings, stock food, brass and bronze castings, building and drain tile, and other products. The city is the seat of Heidelberg College. It was founded in 1812 and incorporated in 1850. Population, 15,800.

Tiflis, *Tye flees'*, the capital of Georgia and of the Transcaucasian Federation of Soviet Republics. It lies in a picturesque valley, and the streets in the outskirts of the town lie one above the other upon the mountainside. Surrounding it are orchards and vineyards. Tiflis was once decidedly Asiatic in tone; now it is modern and is a business center for trade between the Black and Caspian seas, being connected by rail with ports upon each. There are many ancient buildings, and the churches are said to be the oldest of the world. Tiflis has many fine schools, institutes and educational organizations, and manufactures leather goods, tobacco and cotton cloth.

The inhabitants are mostly Armenians and Russians, although many tourists come to visit the hot sulphur springs. Population, 447,000.

Ti'ger, one of the largest and most powerful members of the Cat Family, found in distributed localities of Asia but attaining its fullest development in India, where the largest species, known as Bengal tigers, are found. The skeletons of the lion and tiger are almost identical except for the skull, which in the tiger is more rounding, but in external appearance they differ greatly. The tiger's coat, which is valuable for rugs, is of tawny yellow, striped irregularly with black lines and shading into white on the chest and belly. Its head is massive, with broad nose, erect ears and catlike expression. The body of the largest tiger is nearly seven feet in length. The length of tail is about half that of the body, and the limbs are huge and powerful.

The tiger's home is a cave in a rocky hillside of cool regions, where its family is reared in great domestic comfort and where, during the day, the male may contentedly sun himself before his door. At night he issues forth to conceal himself near springs and pounce upon unsuspecting creatures who come to drink. In times of greatest scarcity, the tiger does not hesitate to carry off human beings, and once having tasted the flesh of man it becomes a dangerous enemy. Many stories are told of its great strength and cunning, both of which seem to be exercised only in procuring food for itself and family; generally the tiger is a slow, dull animal, aroused to ferocity only by hunger, jealousy or fear. The natives of India capture the tiger by means of nets and spears, but English huntsmen employ men to beat up the jungle and drive the beast to the open, where with rifles in hand they await its appearance. Such a hunt, though carried on from the backs of elephants, may be very dangerous, as an enraged tiger does not hesitate to spring upon the elephant and often brings both the beast and its rider to the ground.

Tig'lath-Pile'ser. See ASSYRIA, sub-head *History*.

Ti'gris, a river of western Asia rising in northeastern Turkey and flowing southeast until it joins the Euphrates, 90 m. from the Persian Gulf. It is 1150 m. in length. Its principal tributaries are the Great Zab, the Little Zab and the Diyala. Upon its banks are the cities of Diarbekir, Mosul, Tekrit and Bagdad, and the ruins of the historical cities of Seleucia, Ctesiphon and Nineveh. The Tigris is a rapid stream but is navigable for steamers as far north as the city of Bagdad, while above this, smaller boats and rafts ply continuously. In its southern portion it is united with the Euphrates by many canals, and fertile pasture lands slope to its banks. It is a river of historical importance and is frequently mentioned in the Old Testament.

Til'den, Samuel Jones (1814-1886), an American statesman, born at New Lebanon, N. Y., and educated at Yale College and at the University of the City of New York. Admitted to the bar in 1841, he entered the State Assembly in 1846 and in the same year was a member of the state constitutional convention. He was a great lawyer and by 1855 over half the Northern Railway corporations were his clients. By unearthing the corruptions of the "Tweed Ring" in New York (See TWEED, WILLIAM MARCY), he gained widespread prominence and, after being made governor, was soon recognized as the leader of the national Democratic Party, the first great one since Douglas. In 1876 he was nominated on the second ballot for president, and though elected by the popular vote, he was defeated in the electoral college by one vote, according to the decision finally rendered by the electoral commission (See ELECTORAL COMMISSION). Thus his opponent became president. Tilden declined re-nomination in 1880 and in 1884. He left most of his fortune of \$5,000,000 for endowing a library in New York City; but his will was contested and only \$2,000,000 was thus used.

Tiles, a term applied to a variety of clay products made for ornament or for use. Tiles are laid in walls, mantels and floors and are used for roofs and as draining tiles. The famous Dutch tiles are enameled earthenware, sometimes decorated in colors but usually blue and containing some Scriptural subject in their design. Decorative tiles, in which the main body is one color, with an in-laid pattern of another, are known as encaustic tiles, which is simply a trade name applied rather indiscriminately, and those small, unglazed tiles in plain colors, in which a combination of them forms a picture or design, are known as mosaic tiles. Wall tiles are made with their back surfaces undercut or roughened so that the cement may hold them more securely.

Hollow tiles for fitting around steel columns, girders and arches to form ceilings, partitions, etc., and for fire-proofing purposes, are made on brick machines, where the clay is forced through a die and cut off the proper length by wires, and afterwards dried and burned in a kiln. Drainage tiles are made cylindrical in form in a similar machine, but the clay is pressed more densely, and in order to give the cylinders more strength it is burned nearly to vitrification in a brick kiln. Roofing tiles are generally made of clay and resemble terra cotta in their composition. Various forms, flat, half cylinders, etc., are made, depending upon the manner of their fastening, but they are usually interlocking and of red color. See BRICK; TERRA COTTA.

Till'man, Benjamin Ryan (1847-1918), United States senator, born in South Carolina. He entered the army as a Confederate soldier in 1864; was elected governor of South Carolina in 1890; was reelected in 1892; became United States senator in 1895; and was reelected in 1901 and again in 1907. He secured the passage of the state liquor dispensary law in South Carolina and has taken an active part in educational affairs. Two schools were founded by him, one for girls and one for boys.

Til'ly, Johann Tserklaes, COUNT OF (1559-1632), one of the greatest generals of the 17th century, born in the Castle of Tilly in Belgium. He was educated by the Jesuits, and received his early military training in the Low Countries with the Spanish armies. He distinguished himself in Hungary against the Turks, and in 1610 was appointed by Duke Maximilian of Bavaria to reorganize his army, which post he resigned at the outbreak of the Thirty Years' War, taking command of the forces of the Holy League. In November, 1620, in conjunction with Maximilian, he gained the victory of White Hill, near Prague, and in the following year subdued Bohemia. Created a count, he later opposed Christian IV of Denmark, whom in 1629 he forced to sign the Treaty of Lübeck. In 1630 he succeeded Wallenstein as commander-in-chief of the imperial army, in May of the following year taking Magdeburg by storm. This was Tilly's 36th and last victory. His next opponent was Gustavus Adolphus, who completely defeated him at Breitenfeld, Sept. 17, 1631. Though he gained minor successes over the Swedish general in the following spring, in April he was mortally wounded while contesting the Swedish King near the Lech, in Bavaria.

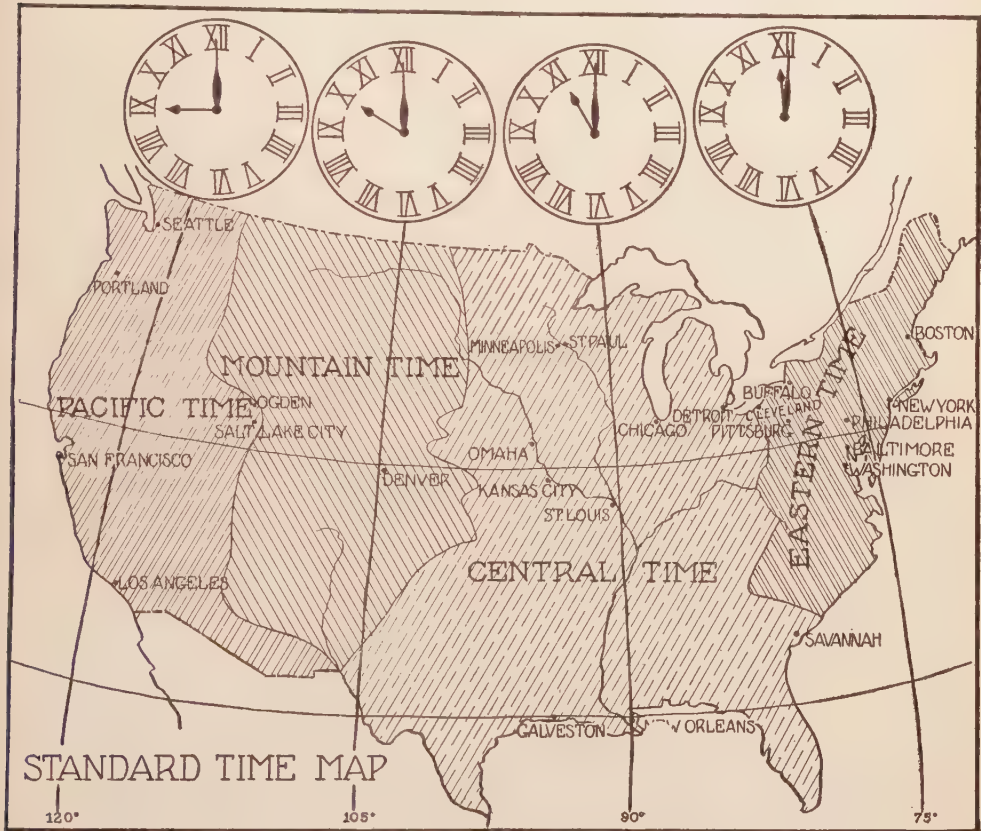
Tim'ber. See LUMBER.

Timbuk'tu, or Timbuc'too, a city of French West Africa, lying at the northernmost point of the Niger River and not far from the Sahara limits. It was once a town of some importance situated on a caravan route connecting the East and the West. At present, though it is still a military station defended by city walls, connected by telegraph with the important African cities and still noted for its exportation of ostrich plumes and gums, it is a desolate town, most of whose buildings are primitive structures of straw and earth. Population, about 5100.

Time, Standard, the time in common use for regulating the affairs of life. Standard time is fixed by law or by usage. The international standard takes

the meridian passing through Greenwich, England, as that from which time is reckoned. It is noon at any place when the sun is on the meridian of that place. Since the earth makes a complete revolution on its axis in 24 hours, $1/24$ of its circumference, or 15° of longitude, will pass under the sun in one

In a country as large as the United States, the local differences in time lead to confusion in operating railways and the transaction of business in general. To avoid these difficulties the standard-time belts were adopted in the United States and Canada in 1882 and made effective the following year. The names



hour. Moreover, since the earth turns on its axis from west to east when it is on the meridian of any given place, as Philadelphia, it will have crossed the meridian of any place to the east and will not have reached the meridian of any place west. For instance, when it is noon in Philadelphia, it will be afternoon in Boston and forenoon in Cleveland, Ohio. The exact difference in time between two places corresponds to their difference in longitude, reckoning one hour of time for 15° of longitude.

and boundaries of the time belts are shown in the accompanying map. Each belt is as nearly 15° wide as possible, and the standard meridian for each belt passes through the middle of that belt. Irregularities occur because of the location of important railway centers, as Kansas City and Ogden. All places within a given belt have the same time, and the difference in time between any two adjoining belts is one hour.

Timothy, a tall, familiar member of the Grass Family, popular both because

of its value as horse feed and because of the cheapness of the seed. Throughout the United States it is sown broadcast, frequently mixed with red clover; the most of the hay offered in the city markets is so grown. Timothy is a common grass, with rather broad, ribbon-like leaves and straight, cylindrical stems bearing close spikes of flowers that resemble cat-tails. Stalks are often seen among the meadow grasses of the roadside, where their height renders them conspicuous. Timothy alone is not suitable for pasture; when allowed to grow, a small bulb forms just beneath the ground; if cattle are pastured upon it while it is still young, the bulbs do not grow and so a permanent sod is not formed. If, however, cattle are turned in upon it late, they soon learn to pull and eat the bulbs. Thus the cattle often find rich pasture upon the timothy stubble but destroy the growth for the spring; for this reason stock should not be turned into the timothy fields immediately after mowing. With red clover 15 lb. of seed should be sown to the acre.

Timothy is grown extensively in the New England States; where it is also known as cat-tail grass and herd's grass; the name timothy is given because the grass was brought from Europe by Timothy Hanson and by him cultivated in Maryland as early as 1720.

Timothy, Epistles to. See PAULINE EPISTLES.

Timur, *Ti moor'*, (1336-1405), a celebrated Asiatic conqueror. He was also called Timur-Beg and Timur i Leng from his lameness, and, by corruption, Tamerlane. Of royal lineage, he peacefully spent his first 24 years at Kesh, where his uncle, Haji Berlas, a Mongol chief, was established. But a formidable inroad against the chiefs of Turkestan in 1360 tested his superior ability, and after intermittent warfare for the next ten years, he was unanimously hailed supreme lord of Turkestan. He then conquered Persia and central Asia, extending his suzerainty from the Great Wall of China west to the Dneiper and north to Moscow. In 1398 he cam-

paigned in Hindustan, routing the armies which had rallied to oppose him, and successfully advancing to the Ganges. Returning to western Asia the following year, Timur attacked the Egyptian Empire in Syria, being uniformly successful at Bagdad, Aleppo and Damascus. He next advanced with a powerful host against Bajazet I, whom he fought at Angora on July 20, 1402. In a desperate conflict the Turks were routed and Bajazet was made prisoner. The subjection of all Asia Minor followed.

Tin, a metal which has long been known and used. It was mined at Cornwall in the days of the Roman Empire and was early alloyed with copper to form the bronze of the arts. Tin occurs chiefly in a combination with oxygen, called cassiterite, and in that form is mined in Peru, Australia, Saxony and Alaska. The Latin name for tin is *stannum*, and thus its compounds are called stannous or stannic compounds.

Tin is a bright, silvery metal having a decidedly crystalline character. If a sheet of tin is bent suddenly it emits a ringing sound known as the "tin cry," which is caused by the friction of its crystals. At ordinary temperatures tin is easily hammered into thin sheets called tin foil, but under the influence of extreme and continued cold it becomes very brittle and disintegrates rapidly. Tin does not oxidize readily, and for this reason is used extensively in coating iron and copper. Iron coated with tin constitutes the tinware of commerce. Some of the principal alloys of tin are gun metal, 10 per cent tin and 90 per cent copper; bell metal, 25 per cent tin and 75 per cent copper; pewter, 75 per cent tin and 25 per cent lead; and bronze, a varying compound of copper, tin, zinc, lead and iron. The backs of mirrors are an amalgam of tin and mercury. Pins are "tinned" by being boiled in a solution of alum, salt, cream of tartar and granulated tin. Some salts of tin are used in calico printing.

Tin'der, a term given to any substance that has been rendered easily ignitable and which burns without a flame.

Previous to the introduction of matches, when the flint and steel was employed, a box containing half-burnt linen or punk was used to catch the spark and ignite sticks which had been previously dipped in melted sulphur. See MATCHES.

Tintoretto, *Teen" to ret' to*, II (1518-1594), one of the foremost painters of the Venetian Renaissance. His real name was Jacopo Robusti. He was born in Venice, the son of a dyer (*tintore*), hence his nickname. After a brief period as a pupil of Titian he opened a studio of his own and subjected himself to a rigid course of training, studying anatomy, color, composition and the classic works of art, striving to unite the design of Michelangelo with the color of Titian, and inviting patronage by offering his services for paltry sums, or gratis. With the exception of a year at Mantua, Tintoretto spent his entire life at Venice. His reputation was firmly established by a series of pictures for the school of San Marco, which reveal his genius at the height of its powers. One of these, *The Miracle of St. Mark*, a highly dramatic work, was pronounced by the critic Taine the greatest painting in Italy. As a painter of portraits and as a colorist Tintoretto was a close rival of Titian; in dramatic power he compared favorably with Michelangelo. He worked with incredible swiftness and produced a large number of pieces, which are to be found in various European galleries and on walls in Venice. His great work, *Paradise*, in the Hall of the Grand Council of Venice, is the largest oil painting in the world. He painted innumerable altarpieces and easel pictures, and decorated in fresco a large number of Venetian palaces. Among his works not already mentioned are *Venice in Glory*, *Marriage of St. Catherine*, *Moses Striking the Rock* and *Christ Before Pilate*.

Tippecanoe, *Tip" e ka noo'*, **Battle of**, an engagement fought in November, 1811, near the site of the present village of Battle Ground, on the Tippecanoe River, in Tippecanoe County, Ind. William Henry Harrison commanded 800 Americans, 500 of whom were Indiana

and Kentucky militiamen, while White Loon, Stone Eater and Winnemac commanded perhaps 6000 Indians. Tecumseh and the Prophet, his brother, had created considerable disturbance among the Indians of the Northwest, and their followers had expressed great discontent by the land cessions of 1809. An outbreak was imminent, so Harrison marched against the Indian headquarters on the Tippecanoe, encamping near the town, Nov. 6, 1811. The Americans were attacked an hour before daybreak by 500 Indians. After a struggle of two hours the Indians fled, abandoning their village, which the Americans burned. The battle hastened the general outbreak of the Indians in the Northwest against the Americans and gave great prestige to General Harrison, who was given command of the troops in the West during the War of 1812.

Tissot, *Te" so'*, **James Joseph Jacques** (1836-1902), a French artist, born at Nantes and educated in the École des Beaux-Arts. His early work consisted of portraits, common-life subjects and scenes of life in Paris. His works were characterized by care in drawing and exact coloring. In 1886 he went to Palestine, where he spent ten years. The result of this sojourn consisted of over 300 studies in the life of Christ in water color. Tissot attempted to portray Christ in the cities and the country and among the people as they appeared at the time. The collection is in the Brooklyn Institute and upon it Tissot's fame largely rests. At the time of his death he was engaged upon a similar series of Old Testament subjects.

Tissue, *Tish' u*, **Animal**. The tissues are the building material of the body, constituting all the elements of the body structure. They may be classified as follows: (1) Supporting tissues include bone, cartilage and connective tissue. The bones and cartilages make up the hard framework, which serves to support and protect the softer body tissues. Connective tissue is the most widely distributed of the supporting tissues. It pervades all parts of the body and holds

together the various organs; it connects bone with cartilage, and its dense network constitutes an abundant intercellular substance, which lies like cotton packing between the other tissues, nourishing them with the lymph fluid held in its meshes. (2) Nutritive tissues are those tissues which carry on the processes of nutrition, including respiration and digestion, secretion and excretion. (3) Storage tissues are those which store up food materials and hold them as a reserve supply to be drawn upon when needed. (4) Nervous tissue forms the basis of the nervous system (See NERVOUS SYSTEM). (5) Motor, or muscular, tissue has a high contractile power (See MUSCLES). (6) Protective tissue consists chiefly of the inner lining of the cavities inside the body, called epithelium, and the outer covering, including skin, hair, nails, etc.

Titan'ic, The, a steamship of the White Star Line and at the time of its completion the largest ship ever built. The *Titanic* and her sister ship the *Olympic* were planned and constructed to excel all other ocean liners in safety and comfort, but on her first voyage from Liverpool to New York the former collided with an iceberg, Apr. 14, 1912. Within a little over two hours she went to the bottom and over 1500 out of a total of 2224 on board lost their lives. Among those who perished were William T. Stead, John Jacob Astor and a number of other prominent men. Those saved escaped in the ship's boats and were picked up by the *Carpathia*. The disaster was one of the most appalling in the history of the sea and led to a thorough investigation by a committee appointed by the United States Senate and a court of inquiry in London. At the time of the collision the *Titanic* was running at 18 knots an hour, and the general verdict was that the speed was too high in the presence of icebergs.

Tita'nium, a metal discovered by Gregor in 1789. Although quite widely diffused, it does not occur in great abundance. It is generally found in magnetic ores, most frequently associ-

ated with iron in ilmenite. Metallic titanium is difficult to separate from its ores because of its readiness to unite with carbon and nitrogen. Titanium gives a bright luster to silver, and toughness and hardness to steel; and in combination with carbon it increases the brilliancy of arc lights.

Ti'tans, in Greek mythology, six sons and six daughters of Uranus and Gæa, or Ge (Heaven and Earth). Saturn, one of them, aided by Earth, killed Uranus, who hated his children, and assumed his rule. Jupiter later vanquished the Titans, throwing some into Tartarus and variously punishing the rest.

Tithes, the tenth part of the yearly profit from the land, since earliest times a rate in a system of taxation for civil and religious purposes. The system of tithing was adopted by the Hebrews for the support of religion (*Lev. xxvii*). In Mohammedan countries it is still used for taxing purposes, quite generally. Many church councils have confirmed this system, and it was adopted by the Emperor Charlemagne. Ethelwulf, King of Wessex and Kent, made the practice of tithing general for all England, about 850. Originally, tithes could be paid to whatever church a man selected, but in 1200 Pope Innocent III decreed that all were required to pay tithes for the support of the clergy in their respective parishes.

Titian, *Tish'an*, or **Vecellio**, **Tiziano**, *Tet syah' no Va chel' lyo*, (1477-1576), the most important painter of the Venetian Renaissance, was born at Pieve di Cadore of a family belonging to the petty nobility. At the age of nine he was sent to Venice to be educated, and in course of time entered the studio of Giovanni Bellini, where his fellow pupils were Giorgione and Palma Vecchio. Some of his most famous works are among his earliest. They include the *Tribute Money*, a carefully finished piece of workmanship, representing the Biblical incident of Christ and the Pharisee, in which is shown, in the head of Christ, a high type of intellectual beauty, and, in the face of the Pharisee,

the characteristics peculiar to his sect. *Medea and Venus*, one of his most celebrated pictures, of wonderful color, was painted in his early period. On the death of Bellini, Titian was named his successor as official painter of the Venetian State. He completed many unfinished works of Bellini and also of Giorgione. To the period between 1513 and 1530 belongs the *Assumption of the Virgin*, in which the Madonna is seen rising through a glory of light surrounded by a host of heavenly beings of supernatural beauty; also, the most important of all his Madonnas, the *Pesaro Madonna*; the *Entombment* (Louvre); and the celebrated *Flora* (Uffizi), with its wonderful treatment of voluptuous beauty and filmy draperies.

After the death of his wife in 1530 Titian's manner of living underwent a change. He entertained royally and lived in great magnificence. As a painter of kings and dignitaries of State he attained wide celebrity. In 1532 he painted a portrait of Charles V with such success that he was appointed court painter, was honored with the Order of the Golden Spur, the title of Count Palatine and the privilege of the Spanish court. Nearly every subject within the range of art came under his hand for treatment: allegories, mythological incidents and historical and Biblical events. The distinguishing feature of his art is color. He was the greatest colorist in the whole galaxy of painters, and his composition at his best shows a wonderful weaving into a scheme of lights and darks a design of luscious color. Titian died of the plague at the advanced age of nearly 100 years.

Titicaca, *Tit' e kah' kah*, the largest lake in South America. It lies in a valley formed by the Andean range and the Cordillera Real, and extends almost equally into the territory of Bolivia and Peru. It is 130 m. long and 30 m. wide. The surface of the lake has an altitude of 12,500 ft. above sea level; its depth is sometimes 700 ft., but more frequently shallow. Its area is about 3200 sq. m. There are several islands and it receives several mountain streams, its outlet be-

ing the Desaguadero River, which flows into Lake Aullagas. On its shores are Puno, Chucuito and Juli and architectural ruins of the Empire of the Incas. Steamboats ply regularly on the lake.

Tit'lark'. See WAGTAIL FAMILY, subhead *Pipit*.

Ti'tle, in law, the union of all elements which constitute ownership of property. Title has two elements, possession and the right of possession. Title to real estate is acquired by descent and by purchase. Records of all titles to real estate are kept in the proper offices in the United States. In most states they are kept by the register of deeds in each county. In the sale of real estate a complete list of the titles and transfers is easily obtained, so that the purchaser may know whether his title is good. See DEED.

Tit'mouse' Family, a family of small birds, of which the chickadee is a



CRESTED TOMTIT

familiar representative in the Northern States, and the tufted titmouse in the Southern States. The family includes about 100 species, some 30 of which belong to America. The titmice live in trees and are of great service to the farmer and orchardist, because they feed upon larvæ and eggs of insects that are

destructive to trees. As the family is not migratory, the farmer has the benefit of their labors throughout the year.

TUFTED TITMOUSE, or CRESTED TITMINT. This bird is about six inches long, gray above, whitish below, with a black forehead, reddish-brown sides and a prominent crest upon the head. The nest is in the cavity of a tree or stump and is made of moss, leaves and bits of cloth, and lined with feathers. It contains from five to eight creamy-white eggs. The habits and motions of this bird are very much like those of the chickadee. It swings from the end of twigs and creeps around trees in all manner of queer and interesting positions.

Ti'tus (40-81), a Roman emperor, son of Vespasian. At the court of Nero he received a liberal education, was military tribune in Germany and Britain and under his father commander of a legion against the Jews. When Vespasian became emperor, Titus was left in charge of the war against Judea. He took Jerusalem in 70 A. D., then visited Egypt and received a triumph when he returned to Rome. He was associated with his father in government and succeeded him in 79 A. D. The destruction of Pompeii and Herculaneum, a great fire at Rome and a fearful pestilence marked his short reign of two years. Titus opened the public treasury and spent his own fortune freely to relieve the people.

Titus, Epistle to. See **PAULINE EPISTLES.**

Titusville, Pa., a city of Crawford County, 45 miles southeast of Erie, on Oil Creek and on the New York Central and the Pennsylvania railroads. On Aug. 27, 1859, the first artesian oil well in the United States was sunk here, and since that time Titusville has been an important center of the oil industry. It has extensive refineries which produce lubricating and motor oils, kerosene, and other petroleum products. Other industrial establishments include steel, iron, and cutlery works, planing mills, and manufactories of tanks, pumping jacks, etc. It is

the seat of St. Joseph's Academy (girls, Roman Catholic). Titusville was settled in 1796, incorporated as a borough in 1847, and as a city in 1866. Population, 8,500.

Toad, a name applied indefinitely to members of various families of Batrachians, but in the United States referring chiefly to those of the Bufonid Family. Toads differ from frogs in having no teeth, a well-developed tongue fastened in the front of the mouth and thus easily thrust out, and a rough, warty skin from which an unpleasant but harmless liquid is exuded. In habit they are more terrestrial than frogs, generally living in the water only during the breeding season; there are, however, aquatic species.

The bodies of toads are broad and squat, and gray or brown in color; the toes of the forefeet, which are without claws or adhesive pads, are free, and those of the hind feet webbed. The life history of the toad records the same stages of development as does that of the frog, but the eggs of the toad are deposited in long, gelatinous strings rather than in a mass; when the tadpole has become a toad it seeks the bank of the stream, where it makes a burrow occupied by day but left during the night, when the insects upon which it feeds are flying. In cold climates toads hibernate and are said to have great power of endurance. Their only means of defense is their power of swelling their bodies to great size, evidently in the hope of terrifying an approaching enemy. See **FROG**; **TREE TOAD.**

Toad'flax'', or Butter-and-Eggs, a roadside weed of the Figwort Family known throughout the United States as far west as the Rockies. The stem is straight and grows from one to three feet in height. The leaves are narrow and practically stemless and have a dusty green color. The flowers are yellow and grow in a thick mass along the top of the stalk, where the upper ones are the last to blossom. In form the blossoms are tubular, but at the edge are irregularly cut into two divisions, or lips, of which the upper has two lobes and the lower

TOADFLAX

three. The middle lobe is extended below in a thick spur and above has a thickened orange-colored ridge, which closes the mouth of the tube. A delicate, slender-stemmed toadflax with blue flowers is found almost as commonly in the United States and southern Canada.



TOADFLAX

Its flowers have the same form but are smaller and less closely set. The leaves are narrower and brighter green in color than those of "butter-and-eggs," giving it a more aristocratic appearance than that of its country cousin. See CROSS-FERTILIZATION.

TOBACCO

Tobac'co, a plant of the Nightshade Family related to the potato and bearing the leaf from which cigars, cigarettes and chewing and smoking tobacco are made. It is a tall plant, but its height varies greatly according to the species; the commonest variety has a straight, unbranched stem bearing broad, stemless leaves and a cluster of tubular, greenish-yellow or rose-colored flowers. The entire plant, except the flowers, is covered with downy hairs, from whose bases exudes a sticky oil which keeps both leaves and stems constantly moist. The active principle of this oil is an alkaloid called nicotine, named from Jean Nicot, who was active in popularizing the use of tobacco in Spain. Nicotine is exceedingly poisonous, but taken in small quantities is a sedative and has a soothing effect upon the nerves; its presence in the plant gives the tobacco its flavor and aroma.

CULTIVATION. One of the most necessary points to consider in raising tobacco is the climate, as only in the presence of warmth and moisture will the desirable aromatic juices be produced. The best tobaccos are those raised where there is but slight variation of humidity and temperature. The soil should be a light, sandy loam where there is much decaying vegetable matter. Potash and lime are the chief chemical constituents desired.

Tobacco plants are grown from seed and are started in nurseries where the soil has been carefully prepared. The seed is very small and its coats are so hard that they are sometimes bruised to allow the entrance of moisture. For sowing, they are frequently mixed with ashes and sowed evenly though not deeply. When from four to six inches high the seedlings are ready for transplanting, an operation performed either by hand or by means of a transplanting machine. By hand, from one to two acres may be planted in a day; by machine, from three to six.

The tobacco field to be prepared for the reception of the plants is plowed in the autumn both to stir up the soil and to destroy the larvæ of injurious insects, and again in the early spring. At the last

plowing, fertilizer is added, after which ridges, three feet apart, are laid for the reception of the plants. The soil must be constantly cultivated and so kept free from weeds. Since the plants are exceedingly delicate and need even temperature, the entire fields or the individual plants are covered with cheesecloth tents and the fields fenced with the same material to protect the tobacco from sun and wind. This method produces the finest grade of tobacco and is now widely employed in the United States. When the buds begin to appear, they are carefully removed by hand so that the rich juices will not be taken from the leaves and stems; if the foliage is thick, some of the leaves are removed with them, but where this is done, suckers immediately appear, which must also be picked off.

As the leaves ripen, they change in color from a dark to a yellowish-green and begin to show lighter yellow spots; at this stage they contain the greatest amount of nicotine and nitrogenous juices. The leaves do not all reach this stage at the same time, so two methods of harvesting have come about; one, the commoner, is the cutting of the entire plant when the middle leaves are ripe; the other is the picking of the leaves singly. In the first case the stalks are split almost to the top and are placed astride poles; the single leaves are strung upon threads and both stalks and leaves are carried to the curing barns, where huge furnaces, located outside of the buildings, regulate the heat within. The bunches are so suspended that they receive the heat and air evenly; then the doors and windows are closed and the heat is gradually turned on. The first day it is allowed to reach 100° F., the second about 125°, and the third and fourth it is kept at 180°. By the end of the fourth day the process of curing is completed, the heat is turned off and water thrown in so that the vapor will render the leaves less brittle and easily handled. They are then taken out and stored.

MANUFACTURE. For manufacture, the leaves are cleaned by a wash of salt and

water; stripped, that is, having midrib removed; and sorted according to size and quality. For cigars and cheroots the leaves are left whole; for cavendish, or plug tobacco, they are pressed into cakes; for pipe tobacco and cigarettes, they are finely cut; for snuff, the midribs and shreds are powdered. The opinion as to what constitutes a good tobacco varies greatly according to the user. Sometimes the upper leaves of one plant produce a poor quality, while the lower ones produce an especially fine quality. The differences in the seasons also cause differences in the amount of nicotine, so that a certain species cannot be depended upon to produce always the same grade of tobacco. In the factories experts sorting the leaves can tell by the touch what the quality of the leaf is and to what use it should be put.

STATISTICS. The United States grows three-fourths of the world's tobacco crop. Its yield for 1928 was 1,373,501,000 pounds; North Carolina led in production with 475,239,000 pounds, followed by Kentucky, 306,000,000; Virginia, 111,600,000; Tennessee, 88,459,000; Georgia, 84,387,000; South Carolina, 82,288,000; Pennsylvania, 49,580,000; Wisconsin, 49,025,000; Ohio, 33,440,000; Connecticut, 29,750,000; and Maryland, 21,700,000 pounds. Japan had second place, with an estimated yield of 147,159,000 pounds; and next in order came Bulgaria, about 43,000,000, and Canada, about 41,000,000. The annual world production is about 1,610,000,000 pounds. A change in tobacco habits during the World War led to the replacement of chewing and smoking tobacco by cigarettes. Cigarette-smoking has shown a large increase the world over. In the United States about one hundred billion cigarettes are manufactured annually.

Tobacco Worm, the larva of an insect belonging to a family of moths of the order Neuroptera. It feeds upon the leaves of the tobacco, tomato and potato plants and, in that stage of its life, is hardly distinguishable from the tomato worm. The tobacco worm, however, develops into a gray-brown moth having a

distinct white spot upon the base of the forewings and two indistinctly separated dark bands running straight across the hind wings. It is very destructive, especially to tobacco in any form, whether growing, or in leaf, in plug or in cigar. Because of its prolificacy it is hard to exterminate. See INSECTICIDE; MOTH; LEPIDOPTERA.

Tobogganing, *To bog' an ing*, a winter sport popular in Canada and the Northern States, which for the pleasure of tourists has now been introduced into Switzerland. The original toboggan was a rude sled without runners, used as occasion required by the American Indians and especially to bring in game over the snow. It was made of bark, with the smooth side down, turned up at the front and strengthened by strips of wood fastened both along the edges and crosswise. The Eskimos make their toboggans out of strips of whalebone. The coasting toboggan of today is about 18 inches wide and from six to eight feet in length; it is commonly made with thin strips of hard wood slightly beveled on the underside, highly polished and turned up in front; it carries perhaps four passengers. On inclined chutes specially prepared a speed of 900 yards in 30 seconds has been attained.

Tobolsk', a town of Asiatic Russia, capital of the province of the same name, situated on the Irtysh River. Points of interest are the monument of Yurmak, the kreml, or citadel, built by the Swedish prisoners during the reign of Peter the Great, a museum and the ruins of the "fort of Kuchum." The industries are fur dressing, fishing and boat building. It was founded by Cosacks in 1587, was once an administrative center for exiles and was, prior to the construction of the Trans-Siberian Railway, an important trading point. It is the see of the Bishop of Tobolsk and Siberia. Population, about 25,000.

Tocantins, *To" kahn teens'*, a river of Brazil. It is practically a branch of the Amazon, and, rising in the southern part of the State of Goyaz, it flows north and empties into the Atlantic Ocean through

the Rio Pará estuary. Its length is 1700 m., and its chief tributary, the Araguayá. Rocky reefs and rapids impede continuous navigation; the Falls of Itaboca, 130 m. above the estuary, are a complete obstruction.

Tocqueville, *Tok' vil*, Alexis Henri Charles Clérel, COMTE DE (1805-1859), a French statesman and political writer, born in Verneuil. He became a lawyer in 1825. Six years later, with one colleague, he was officially sent to study the penitentiary system of the United States. The following year results of the inquiry were published, and subsequently Tocqueville was instrumental in reforming not only the prisons of France but those of the Continent. After 1849 he was for a short time minister of foreign affairs, but after 1851 he retired from public life. His two celebrated works were *Democracy in America*, which was translated into many European languages, and *The Ancient Regime and the Revolution*.

To'ga, the chief outer garment of the Romans. It was made of wool, closely woven with a combed nap. Its shape changed from time to time. In the Roman Empire it was elliptical in form and long enough to be draped about the body and over the shoulders. The ordinary citizen wore a toga of pure white; boys and magistrates wore togas with crimson borders. Other modifications were made use of for special occasions and by different dignitaries.

To'go, **Heihachiro**, COUNT (1847-), a Japanese admiral. He was sent to England in 1871, where he learned seamanship by serving on board a warship and studying at the Thames Nautical College, Greenwich. A captain at the beginning of the Chino-Japanese War, he attained the rank of vice-admiral at its close; and when war broke out between Russia and Japan in 1904, he held command of the Japanese fleet. He distinguished himself by the bombardment of Port Arthur, by the sinking of the Port Arthur fleet and by the brilliant victory he gained over the Russian fleet in the Sea of Japan, May, 1905.

Togoland, a German protectorate in West Africa, now under the joint mandate of Great Britain and France, with an area of about 33,000 sq. m. It is bounded on the n. and w. by the Gold Coast Colony, on the e. by Dahomey and on the s. by the Gulf of Guinea. It is drained by the Sio, Mono, Haho and Dako rivers. The natural resources are abundant, but the climate is unhealthy; the principal products are cocoanuts, corn, rice, tobacco corn, palm oil, rubber and copra. Estimated population, 2,500,000.

Tokyo, *To ke o*, or **Tokio**, the capital of the Empire of Japan, situated on the banks of the Sumida River, on the southeast coast of the Island of Hondo. It covers an area of about 30 square miles.

Before the disastrous earthquake of 1923, which laid two-thirds of the city in ruins and took a toll of some 70,000 lives, Tokyo was a city of contrasts—of narrow crooked roads which emerged into paved boulevards, of three-story brick buildings standing beside one-story wooden shops, of pagodas and sculptured gateways, of bell towers and Buddhist temples in the midst of which rose Greek and Roman Catholic cathedrals. On its streets motors and street cars whizzed by coolies pulling their picturesque rickshaws. There were several lovely parks, notably Asakusa Park with its famous Temple of Kwannon.

In the center of the city stands the beautiful imperial palace, half Japanese and half European in its architecture and surrounded by a double line of moats. It caught fire but was not seriously damaged by the quake. Near by were the arsenal and the other government buildings, almost all destroyed, and to the east were the business houses. The Imperial Hotel, of American design, weathered the quake. Several canals emptying into the Sumida cross the business district. The famous Nihon-bashi (Bridge of Japan) across the Numida is the topographical center of Japan and the place from which all distances are measured.

The Imperial University and the two great private universities, Keiogijuku and Waseda, the military and naval colleges, and the Christian college for women make Tokyo the chief educational center of the Far East.

Due to the frequent earthquakes few large

buildings were constructed and the houses were to a great extent one-story wooden structures. An elaborate reconstruction plan after the 1923 quake, which called for wider roads, new thoroughfares, and many open spaces, was largely abandoned because it meant displacement of many temporary homes and shops. The new buildings are either large concrete or small wooden structures.

Tokyo was in the 15th century the small village of Yedo. In 1868 in the fall of the Shogunate, the mikado took up his residence there and changed the name to Tokyo, meaning "eastern capital." Population, 1,995,567.

Tokyo, University of. This is a government institution and is often designated as the Imperial University. It is the principal institution of higher learning in Japan, the government university at Kyoto being a comparatively new institution. Founded in 1868 by the union of two existing schools, the University of Tokyo is governed by a president and a board of councilors who are appointed by the minister of education for five-year terms. In this board there are two representatives each from the colleges of law, medicine, literature, science, engineering and agriculture. The equipment, especially for work in engineering and in agriculture, is extensive. The university also maintains a marine biological laboratory, botanical gardens and an astronomical observatory. The physicians and surgeons trained at Tokyo won international fame by their marvelous successes in the prevention of avoidable disease and mortality during the war with Russia. The large faculty is now composed largely of Japanese scholars trained in Europe or America, though formerly it employed many foreign instructors.

Toledo, Ohio, a manufacturing center and port and the county seat of Lucas County, at the western end of Lake Erie, on the Maumee River near its mouth. It is the third largest city in Ohio and the third largest railroad center in the United States. A channel 400 feet wide and 21 feet deep admits the largest lake vessels, of which many winter there. The city has 25 miles of docks and warehouses. It is the world's leading city in soft-coal shipments and is an important distributing center for

the iron and copper ore, lumber, and grain from the northwest, the fruit from Michigan, and varied products from Indiana and the Ohio Valley.

With these advantages in securing fuel and raw materials, Toledo inevitably became a great manufacturing center. There are nearly 700 industries, producing widely diversified commodities. The greatest is the manufacture of automobiles and automobile accessories and equipment. The city is the world's leading center for the production of metal wheels. Other leading products are sheet glass, made largely from a fine quality of sand found near by, surgical instruments and atomizers, electrical apparatus, foundry and machine-shop products, and computing scales. Oil is piped into the city from the mid-continent oil field.

Toledo has many miles of beautiful boulevards and more than 1,800 acres in parks. Ottawa, Germain, and Bay View parks are the most noteworthy. There are also a number of municipal golf courses and public playgrounds for children. A splendid art museum with a \$10,000,000 endowment is one of the city's attractive features. The city is the seat of the University of the City of Toledo, a municipal co-educational institution established in 1884; of St. John's University, a Roman Catholic school for men established in 1898; and of a number of preparatory schools. A state hospital for the insane is situated here.

The site of Toledo lies within a great tract of land constituting 16 reservations acquired by the United States government in 1795 from several Indian tribes. A stockade, called Fort Industry, was built here in 1800. In 1817 two companies purchased a tract of land from the government and laid out the town of Port Lawrence. In 1832 another company laid out the town of Vistula. In the following year these villages were united and named Toledo, after the old Spanish city. The city was incorporated in 1837. The government is a modification of the

federal plan. The city became widely known for its successful efforts to emancipate itself from machine politics under two reform mayors—"Golden Rule" Jones, a manufacturer, and Brand Whitlock, a native son who was subsequently American ambassador to Belgium during the World War. Population, 305,400.

Toledo, Spain, the capital of the Province of Toledo, and at one time of the whole kingdom, 42 miles southwest of Madrid, on the Tagus River. It occupies a rugged promontory of granite washed on three sides by the river, which here rushes through a deep gorge. Seldom have the appearance and atmosphere of a medieval Gothic city been preserved with so little change as in Toledo. It has from the earliest times been the center of Spanish Christianity, and its archbishop is styled "Primate of all the Spains." It has a magnificent Gothic cathedral dating from 1227. The Alcázar, a huge square building with four towers, dominates the city. It was first built as a citadel by the Visigothic king Wanda, in the 7th century. It was later converted into a palace and was several times burned down and restored. Toledo was noted for the manufacture of sword blades even before the time of Roman rule and there are still famous establishments devoted to the manufacture of arms.

Toledo is a very ancient city. It was captured by the Romans in 193 B.C., and became the capital of Carpetania. Its ecclesiastical importance dates from the introduction of Christianity into Spain; a number of church councils were held here, notably in 396, 400, and 589. From 534 until the Moorish conquest it was the capital of Visigothic Spain. It prospered under the Moors. It was captured by Alphonso VI of Leon and Castile, in 1085, who made it his capital. Its decline dates from 1560, when Philip II chose Madrid as his capital. Population, 25,000.

Tolstoy', Leo, COUNT (1828-1910), a Russian novelist, born in Yasnaya Poly-

ana, south-central Russia. He rather rigidly divided his life into four periods: the innocent, happy time of childhood; the "terrible twenties," when ambition, licentiousness and pride were his ruling passions; his honest and upright married life, marred by egotistic desires; and the period following his conversion to Christianity, when he attempted to shape his life in accordance with the Sermon on the Mount. Left to the care of an aunt after the death of his parents, he was removed to Moscow in 1837, and after attending the University of Kazan he later studied law at the University of St. Petersburg. Already at this time he was morbidly brooding over the Why of things.

Upon accompanying his brother to the Caucasus, he was drawn into active military service. Now, too, he began to write, publishing *Childhood*, *Incursion*, *Boyhood* and *The Morning of a Proprietor*. After participating in the defense of Sebastopol and witnessing its bloody horrors, he wrote *Sebastopol in December*, 1854; *Sebastopol in May*, 1855; and *Sebastopol in August*, 1855; all were realistic accounts, cruel in their truthfulness, and his superior genius was quickly recognized. In 1857 he started for Germany and France, and between the years 1857 and 1861 visited Europe three times, chiefly to study the educational systems of Germany. On his return he established a school for the peasants at his native town, attempted to put into practice his theories, overworked and was forced to abandon the project. *The Cossacks*, published in 1863, was sold to the editor of the *Russian Messenger* to pay a gambling debt incurred during one night's high play. He married in 1862, and for several years his wife, the Countess, shared his literary enthusiasms as well as the burden of copying the manuscripts which he soon began to write. Slowly the idea of renouncing all rights to his possessions grew stronger, and in 1888 he made over all his property to wife and children, thereafter giving little thought to material comforts or wants. He became a la-

borer of the field and toiled by the side of the humblest peasant, doing much to relieve those suffering from poverty and want.

In considering the life work of this man who had for a long time the unchallenged position of the greatest of modern writers, two matters must be considered, his practical services and social theories and his literary activity. With the first is connected his attitude to religion. After once accepting Christianity as a sole guide to conduct of life, love, self-denial and humility became the enviable, desirable virtues. He rejected all human institutions—the State, Church, kingly power, army, jury and marriage—because they interfered with the complete development of the individual. Simplicity became his watchword, and, near the close of his long literary career, he wrote homely tales for the peasant class, knowing their wants and interests through association with them in the fields.

Of his literary works the novel *Anna Karenina* unquestionably ranks supreme. Here he touches on the vital questions centering around married life, and the moral force of this masterful study of sin is tremendous. In plot it is staggering and weak; the development is rather with the characters, and that is why life itself is more in evidence in the book than art. There is nothing of the condensation characteristic of all of Turgeniev's work; the style is simple and direct. In *War and Peace*, a Russian prose epic, a magnificent drama of the Napoleonic wars is revealed. The *Kreutzer Sonata*, published in 1890, was a startling story in which many read a complete denouncing of marriage, but which, in truth, was a powerful condemnation of immorality and vice, and as such presented lofty ideals. Other great works of this master, who towered head and shoulders above his contemporaries and became the greatest figure that his country has produced, are, *Confession*, *My Religion*, *What Shall We Then Do?* *The Death of Ivan Ilyitch* and *Resurrection*.

Tol'tec, a people who lived in Mexico supposedly before the conquest of that country by the Aztecs. They have been the subject of much historical controversy, but it seems that they were a cultured people and that the Aztecs obtained from them much of the civilization that they possessed at the time of their conquest by the Spaniards. Their capital was Tollan, whose ruins still reveal something of the civilization. See **AZTEC**.

Tom'ahawk, a weapon used by the North American Indians. It is a light war axe or hatchet. The head of the tomahawk was made originally of stone, sharpened at one or both ends of the head and fastened to a handle. Later, the white traders brought hatchets which took the place of the bone or stone heads. The hammer end of the head of the ceremonial hatchet was often made as a pipe bowl and the handle was hollowed to serve as a pipe stem.

Tomato, a garden plant, or the fruit of the plant, of the Nightshade Family. A native of South America, it is cultivated in all temperate regions and is canned in greater quantities than any other vegetable. It was formerly called "love apple" and, until well into the 19th century, was thought to be poisonous. The plant is a bushy annual grown from seed. It has jagged leaves and small yellow bell-like flowers. After a century of selective breeding the fruit is smooth, thin-skinned, and fleshy, and in some varieties reaches two or three pounds in weight. The red tomato, which is round and somewhat flattened at the ends and is usually two or three inches in diameter, is the most popular; though a small yellow pear-shaped variety is used, especially for preserves. Tomatoes are richer in vitamins A, B, and C than any other vegetable except spinach, and lose very little of their vitamin value in cooking or canning.

Tombig'bee River, a river of the United States. It rises in the north-eastern part of Mississippi, flows south-southeastward into Alabama and unites

with the Alabama River to form the Mobile. Its length is 450 m., and it is navigable to Aberdeen, Miss.

Tom'tit', **Crested**. See **TITMOUSE FAMILY**, subhead *Tufted Titmouse*.

Tonawanda, N. Y., a manufacturing city of Erie County, 10 miles north of Buffalo, on the Erie Canal and the Niagara River, at the mouth of Tonawanda Creek, and on the New York Central Railroad. Bridges across the creek connect it with North Tonawanda. The city has extensive iron, steel, and lumber interests. Office systems and furniture, fiber products, paper, and roofing are important manufactures. Originally a part of Buffalo, it was incorporated in 1854 and became a city in 1903. Population, 11,500.

Tonga, To'ngah, Islands, or Friendly Islands, a group of Polynesian Islands in the Pacific Ocean, forming a native kingdom but under British control. They lie east of the Fiji Islands and about 350 m. s.w. of Samoa. The area of the 150 islands is about 385 sq. m.; the most important and the most fertile is Tongatabu. The vegetation luxuriates in the fertile soil, and palms are abundant. There is regular steamship communication with Great Britain and the harbors are generally good. The islands were discovered in 1643, and when Cook explored them, in 1773 and in 1777, he called them Friendly Islands because of the friendly attitude of the natives. The population is about 25,000, chiefly Tongans. Europeans number about 600.

Tongue, Tung, a muscular organ, situated in the floor of the mouth. Its parts consist of a main body; a base, near the pharynx and forming the front wall of that organ; an upper surface; a root, by which it is attached to the hyoid bone in the neck and to the floor of the mouth; a tip near the outer opening of the mouth; and an under surface which comes in contact with the front floor of the mouth and with the lower front teeth. The tongue is a highly movable organ, being made up almost entirely of muscles, whose fibers extend in every direction, and by means of which it may

undergo many changes of shape. Its surface is covered with a mucous membrane, or epithelium, which is studded with a multitude of minute elevations called papillæ, containing the end organs of the nerve of taste, which form what are known as taste bulbs. Glands secreting the mucus by which the tongue is kept moistened are abundantly distributed in the back part. Not only does the tongue serve as the chief organ of taste, but it aids in the mastication of food, in swallowing and in articulate speech.

Ton'kin', or **Tongking**, a province of French Indo-China, bounded on the n. by the Chinese Provinces of Kwangtung, Kwangsi and Yunnan, on the w. by Laos, on the s. by Annam and on the e. by the Gulf of Tonkin. It has an area of about 46,000 sq. m. Geographically it consists of three regions—the delta of the Red River; two mountainous tracts, to the north and west of the delta; and a region of plateaus and low hills forming a transition between the delta and the mountains. The climate is tropical, rainfall heavy and the soil fertile. Dense forests grow where the land is uncultivated. Rice grows abundantly in the delta, and elsewhere there are plantations of coffee, tobacco, ramie, cotton, jute, sugar cane, pepper and the mulberry. The cultivation of silkworms is increasing in importance. Various metals are found in the province, but only gold and tin are exported. Coal of an inferior quality is mined. Cotton spinning, the manufacture of carved and inlaid furniture, enameling and metal ornamentation are other industries. Tonkin has been a French possession since 1884. The capital is Hanoi and Haiphong is the chief port. Population, about 7,000,000, 7,000 of whom are Europeans.

Ton'sil, a small ovoid body, situated between the pillars of the soft palate. There is one on each side of the throat. The tonsils are doubtless glands. They frequently become inflamed during a cold or by the entrance of germs, which produce the disease known as tonsillitis; and swelling and suppuration of the tonsil constitutes quinsy. See **QUINSY**.

Tonty, *Ton' tee*, or **Tonti**, **Henry de** (about 1650- about 1704), a French explorer and companion of La Salle, born in Italy. He served in the French army, and in July, 1678, accompanied La Salle to Quebec, going with him to the Niagara River, and aiding in preparations for his great trips. In March, 1680, La Salle left him in charge of Ft. Crèvecoeur on the Illinois. This, Tonty had to abandon because of mutinies and hostile Indians, and, returning to Green Bay, he wintered there. Having later joined his chief at Michilimackinac and accompanied his last great expedition down the Mississippi, Tonty was put in command of Fort St. Louis, on the Illinois, near Ottawa. In searching for La Salle, in fighting against the Senecas and the English, Tonty passed his time among the Illinois Indians till 1702, when he joined D'Iberville in Louisiana, where he passed the remainder of his life.

Toombs, *Tooms*, **Robert** (1810-1885), a United States senator, born in Georgia. He was educated for the bar and practiced law, few lawyers of his state enjoying the reputation which he attained. In 1837 he was sent to the Legislature; from 1845 to 1853 he was a Whig member of the House of Representatives, where he became a leading orator and debater; and from 1853 to 1861 he was United States senator. When Georgia withdrew from the Union, he resigned his seat in the Senate. He was a member of the Confederate Congress in 1861, and was made secretary of state for the Confederacy. He served in the Confederate army as brigadier-general. From 1865 to 1867 he lived abroad. Upon his return he resumed his law practice, but refused to take the oath of allegiance to the United States Government.

Top, a familiar toy made for children's use. Tops are commonly constructed in the form of a pear, of hard wood, with a metal point, and are made to spin by drawing off a cord that has been previously wound around the surface. Metal tops are made much larger and are hollow, with openings in their sides whereby they whistle or give forth

musical sounds when they are set spinning. These are handsomely decorated in colors and are more expensive than common tops. See GYROSCOPE.

To'paz, a mineral composed of silicate of aluminum, containing oxide of iron and fluoric acid. It is found in parts of the United States, in Ceylon and other parts of India, in Brazil and in Great Britain. The hard crystallized varieties used as gems are of a vitreous luster, sometimes colorless, and again yellow, green, blue and red, and vary from transparent to translucent. Topaz is harder than quartz and heavier than water. The ancients regarded this stone as a symbol of friendship, and as a talisman to bring courage and dispel sadness.

Tope'ka, Kan., capital of the state and county seat of Shawnee Co., 67 m. w. of Kansas City on both sides of the Kansas River, and on the Union Pacific, the Missouri Pacific, the Atchison, Topeka & Santa Fe and the Chicago, Rock Island & Pacific railroads. Topeka is situated in a fertile agricultural region, and the city is an important jobbing center. Natural gas is piped from the southern part of the state for domestic use and manufacturing purposes. Topeka is regularly laid out and has an elevation of 890 ft. above sea level. The streets are wide and well paved, and there are many handsome residences surrounded by large lawns and attractive gardens. The city contains about 75 m. of electric railway, and interurban lines reach out to neighboring suburbs and villages. Among the largest parks are Garfield, Central, Willow City, Edgewood, Westlawn, Ripley, Gage, Chesney, and Children's.

Topeka has many beautiful buildings of which the most noteworthy is the capitol, which occupies four squares of ground in the heart of the city. The value of the building is about \$3,000,000. Other public buildings include the Federal Building; courthouse; city library, containing a museum; governor's mansion; city hall; the Auditorium, with a very large assembly hall and a large pipe

organ; the Chamber of Commerce Building; the Y.M.C.A. and Y.W.C.A. buildings; 26 hotels; the Memorial Building, containing the state historical relics; the Capper, Santa Fe General Offices, Mills and Mulvane, National Reserve Life, Capital, Loan, and New England buildings; and about 78 church edifices, which include the Grace Church Cathedral (Episcopal). The city is the see of an Episcopal bishop. The leading educational institutions include Washburn (formerly Lincoln) College (co-educational, Congregationalist), which took its present name in 1868 in honor of Ichabod Washburn, its generous benefactor; the College of the Sisters of Bethany (Episcopal); the Kansas Vocational College (colored, state); and the State Industrial School for Boys. The benevolent and charitable institutions include the Topeka State Hospital for the Insane, the Kansas Children's Home and Service League, and the Capper Fund for Crippled Children.

Topeka's leading industry is meat-packing. The city is widely known as a milling center and has a number of immense roller mills; and a large annual volume of printing and publishing gives this business a leading place among its industries. Among the important products of its industrial establishments are metal products, furniture, office fixtures, machinery, soft drinks, sand and crushed rock, building brick, milk bottle caps, railway-tie tongs, pillows, mattresses and mattress-making machinery, custom-made shirts, wind mills, tents, and awnings. The Santa Fe has extensive shops here.

In 1854 the site of the city was chosen by people from Lawrence, 30 miles distant, and from the first was a free-state stronghold. Under the Wyandotte constitution Topeka was made the temporary state capital and it became the permanent capital in 1861. It was granted a city charter in 1857. Population, 59,500.

Top'lady, Augustus Montague (1740-1778), a clergyman of the church

of England, born at Farnham, Surrey, and educated at Westminster School and Trinity College, Dublin. Ordained a priest in 1764, he became rector in 1768. He died of consumption. Toplady was the great champion of Calvinism in the Church of England, and wrote ably against the Methodists, often however with undue vigor. Besides editing for several years the *Gospel Magazine*, he wrote numerous controversial works, mostly in reply to Wesley, and the popular hymn, *Rock of Ages, Cleft for Me*.

Torna'do, a whirlwind or cyclone, characterized by the presence of a dark funnel-shaped cloud. This cloud appears to hang suspended from an intensely dark mass of storm clouds, its apex toward the earth. It rotates with terrific swiftness in a spiral, upward-sucking movement in a direction contrary to that of the hands of a clock, and travels forward usually from southwest to northeast. The precursor of a tornado is a heavy mass of black clouds which appear on the horizon in a state of violent commotion. These clouds are often of a dark greenish hue and resemble the volumes of smoke emitted from the smoke-stack of an engine. From them the funnel cloud appears to descend by gradual lengthening until the level of the surface is reached. As the clouds approach, a heavy rumbling sound is heard, which increases in intensity until all other sounds are lost in its tumultuous roaring. In front of this rapidly moving cloud mass only a gentle, warm breeze is usually stirring, or perhaps perfect calm prevails. Into this quiet area whirls the tornado, destroying everything in its path and leaving behind the same condition of calm which preceded it, but a lower temperature. The funnel cloud touches the earth's surface for distances varying from about 25 m., when it rises and sweeps clear of the ground. It moves forward at an average rate of 40 to 50 m. an hour, though it sometimes reaches a speed of 100 m. an hour. The velocity of the air circulation within the tornado itself has been estimated to be as great as 500 m. an hour, though this

measurement is made only by reference to the resistance of objects which the tornado has power to move. The violence of tornadoes is not usually long sustained. These storms rarely travel a distance greater than from 100 to 200 m. and usually have a narrow track, though they have been known to go thousands of miles.

Tornadoes are caused by local differences in atmospheric density. A layer of surface air, having become abnormally heated, is set in motion by some slight disturbance of the air. As it begins to rise, the cooler air of the surrounding areas rushes with a spiral motion toward the storm center, increasing in velocity as the vortex is approached. The centrifugal force at the center of the whirl reduces the air pressure and lowers the temperature to dew point, where condensation takes place. Thus the cloud is formed; and it is carried forward by the prevailing wind of the region in which it occurs.

The conditions necessary for the formation of tornadoes are found in low altitudes and where there is considerable moisture, such as is found in the lower and middle latitudes. These storms occur in southern Asia and western Africa and sometimes in parts of Europe, but they are most frequent in the central and eastern parts of the United States, taking place usually in the late spring and summer. In all localities where they occur they are the most violent of all atmospheric disturbances.

Toronto, Ontario, the capital and largest city in the province and the second largest city in Canada, on the north shore of Lake Ontario, opposite the mouth of the Niagara River, and on the Canadian Pacific, the Canadian National, and the Toronto-Hamilton & Buffalo railroads. There are a number of airports and several lines of air passenger and express service. The city has a water frontage of about 10 miles from east to west. The harbor, which has been greatly improved, is formed by a sandy islet extending five miles into the lake. The port accommodates

the largest vessels that come through the Welland Canal, and there is a large lake commerce. Passenger service is maintained to other lake ports and to ports on the Niagara River. Yonge Street, extending $6\frac{1}{2}$ miles from the waterfront to the north city limit, divides the city into halves.

PARKS. In Toronto's park system are some 75 parks (including athletic fields, neighborhood parks, town squares, horticultural and zoölogical parks, and picnic grounds) and 50 supervised children's playgrounds. The island in the bay, which is reached by ferry, is a natural playground. It contains an amusement park, an athletic field and a stadium, resort hotels, and the Royal Canadian Yacht Club. Sunnyside Beach is a large lakeside amusement resort. Riverdale Park is noted for its zoölogical gardens and Allan Gardens, for their floral display.

BUILDINGS AND INSTITUTIONS. Among Toronto's most imposing buildings are the Parliament buildings, of Romanesque design, and the Toronto University group. Government House, the residence of the lieutenant-governor of the province, is an impressive edifice built somewhat after the French chateau style. The City Hall is a massive stone structure surmounted by a clock tower 300 feet high; a cenotaph, dedicated by citizens of Toronto to those who fell in the World War, stands in the center of the first flight of steps leading to the main entrance. The city is the see of an Anglican bishop and of a Roman Catholic archbishop, and St. James' (Anglican) and St. Michael's (Catholic) cathedrals are among the many notable churches. The Royal Ontario Museums of Archaeology, Geology, Mineralogy, Palaeontology, and Zoology, maintained jointly by the government of Ontario and the University of Toronto, and the Toronto Art Gallery contain valuable collections. The Canadian National Institute for the Blind, founded in 1918 by a group of blinded soldiers, civil blind, and other interested citizens is situated

here. The buildings of the Canadian National Exhibition, held annually at Toronto, are masterpieces of exhibition architecture. The Royal Agricultural Winter Fair is also held here each November at the Royal Coliseum and the Live Stock Building, at Exhibition Park. Of the city's many hotels the Royal York is the largest. At the time of its completion, in 1929, it was not only the British Empire's largest hotel but also its tallest building ($399\frac{1}{2}$ feet high, with 30 stories).

Toronto is the seat of the University of Toronto, which is the provincial university of Ontario and Canada's largest university (See TORONTO, UNIVERSITY OF). McMaster University, another of the Dominion's leading educational institutions, which is owned and controlled by the Baptist Convention of Ontario and Quebec, is also situated here (See McMASTER UNIVERSITY). The Toronto Normal School, the Academy of Medicine, and Osgoode Hall Law School are other educational institutions.

COMMERCE AND INDUSTRIES. Toronto is the chief distributing center of Ontario, with an extensive trade, particularly in grain, fruits, and live stock. It is the wholesale jobbing center of Canada and has a large shipping trade. There are about 3,000 factories, producing a large variety of articles. The city leads Canada in the packing industry; in printing and publishing; and in the manufacture of electrical apparatus, biscuits and confectionery, farm implements, and other products. Other important manufactures include automobiles and trucks, castings, machinery, jewelry, paints and varnishes, medicine, inks, pianos and radios, scientific and medicinal apparatus, flour, cigars, fur and leather goods, butter, carpets, cloth, hosiery and knit goods, paper products, engravings, furniture and boxes. The Toronto hydroelectric system is one of the largest municipal supply undertakings in North America. It derives its power from Niagara Falls and the Gatineau River.

HISTORY. The name Toronto is of Indian origin, meaning "a place of meeting." The site of the city was an established rendezvous of Indian tribes before the coming of the white man. The French, in 1749, built Fort Rouille here and started a trading center. In 1793 the fort was burned by the French to prevent its occupation by the British. A year later Governor Simcoe transferred the seat of government of the new province of Upper Canada here and named the place York. The town was twice sacked during the War of 1812. It was incorporated under its present name in 1834. It suffered severely during the rebellion of 1837, and also from fire in 1849 and 1904. Population, 586,000.

Toronto, University of, at Toronto, Ontario, Canada (1827). Founded under the name of King's College, this institution, the provincial university of the province of Ontario, was opened in 1841 and took its present name in 1849. It is the largest university in Canada and the second largest English-speaking university in the British Empire.

There are nine faculties: arts (including sciences and commerce), medicine, applied science and engineering, household science, education, forestry, music, graduate studies, and dentistry. The university has four arts colleges: University College, Victoria College, Trinity College, and St. Michael's College; and there are three federated theological colleges: Knox, Wycliffe, and Emmanuel. Affiliated with the university are the Ontario Agricultural College, the Ontario Veterinary College, the Ontario College of Pharmacy, and the Ontario College of Art. More than 1,000 degrees are conferred each year.

Torpe'do, a species of electrical fish. See ELECTRICAL FISH.

Torpedo, a water-tight case containing an explosive for the destruction of a ship's bottom. The spar was the first successful type to be developed. It came into existence during the Civil War. The torpedo was fastened to the end of a spar

about 30 feet in length attached to the bow of a small boat. Upon approaching the vessel attacked, the torpedo was lowered and the speed of the boat carrying it exploded it upon its contact with the ship's bottom. In the Civil War the *Houssatonic* and the *Albermarle* were sunk by such torpedoes. In both cases the attacking boats suffered severely.

The controllable torpedoes were floated by various devices and driven by motive power within themselves, controlled by electricity. To this class belong the Lay-Haight, the Sims-Edison, the Ericsson, the Nordenfelt, and the Harvey, a towing torpedo.

The automobile torpedo is an automatic mechanism, propelling, steering, and exploding itself after once set in motion upon its destined course. To this class belong the Whitehead and the gyroscope. The Whitehead is now used in all the navies of the world, almost to the exclusion of any other. It is often 16½ feet long and 18 inches in diameter, with sufficient stored power to drive it 28 knots an hour for a distance of 800 yards after it comes under its own control, which happens soon after it reaches the end of its flight from the tube which threw it. If it fails to reach its destination and to explode, it may be recovered and used again indefinitely. An automobile torpedo has been developed which can be directed by wireless from a shore station and thus may prove an important factor in coast defense. See WARSHIP.

Torque, the name given in mechanics to the turning moment of a force. It is numerically equal to the product of the force by the effective length of its lever arm. For example, if a man pushes with a force of 50 lb. at the end of a crank three feet long, the turning moment, or the torque, which he exerts is 50x3, or 150, pounds feet. The term *pounds feet* indicates that in calculating the torque, forces were measured in pounds, and distances in feet. See MECHANICS.

Torrens System, a plan of registration of land titles which simplifies the transfer of real estate and renders com-

paratively easy the examination of titles. It was devised by Sir Robert Torrens, an Englishman, from whom it derives its name, and was first successfully used in Australia. The system is operated through a bureau of registration, in charge of a registrar, and becomes effective on the first transfer of any property after the establishment of the system.

The method of obtaining a Torrens title in the United States is, in general, as follows: The owner wishing to have his title registered makes application to a court having chancery jurisdiction. This application, with all records relating to the property (including a statement of encumbrances, etc.), is referred to the examiner of titles, who makes a report. All persons having an interest in the property are summoned as defendants. The court then issues a decree based upon the evidence and the finding of the examiner. This decree is registered by the registrar and a certificate of ownership is issued. This certificate is issued in duplicate, one copy being filed in the office of the registrar and the other being given to the owner. This examination or registration of title does not have to be repeated after a certificate has once been issued, the transfer of the certificate with accompanying entry of that fact in the registrar's office completing the transaction.

Should any person suffer loss through omission, misdescription or any error in the certificate issued by the registrar, he is indemnified from an insurance fund created for that purpose. This fund is provided by a small tax on the value of the property, at the time that the first certificate of title is granted, in addition to the registration fees. The fees for registration under the Torrens System are comparatively small, though varying in different localities. The Torrens System is in use in Australia and New Zealand; in British Columbia, Manitoba, Saskatchewan, Alberta and Ontario; in parts of Continental Europe; and in several states in the United States. In England the Torrens Act provides for three forms

of registered titles—absolute, qualified, and possessory. The third form is the only one extensively used there.

Torres Strait, a narrow strait separating Cape York Peninsula, Australia, from the Island of New Guinea, and connecting the Coral Sea with Arafura Sea and the Gulf of Carpentaria. It is about 90 m. in width and contains many shoals and half-submerged coral reefs that render navigation dangerous. The strait was named after the explorer Torres, who sailed through it in 1606.

Torrington, Conn., a manufacturing city of Litchfield County, 26 miles west of Hartford, on the Naugatuck River and on the New York, New Haven & Hartford Railroad. It is noted for the manufacture of brass products. Other products include machinery, skates, tools, electrical appliances and gaskets, bicycle pedals, millwork, needles, and hardware. Torrington is beautifully situated near five lakes in the foothills of the Berkshires. It was incorporated as a town in 1740, as a borough in 1887, and as a city in 1923. It is the birthplace of John Brown. Population, 25,100.

Tort, a civil wrong other than breach of contract, for which the injured party is entitled to damages. A tort may be a lawful act performed by unlawful means or for malice, an unlawful act or the result of negligence. A criminal act may also be considered as a tort. In such a case the party committing the crime is liable to two prosecutions, one by the State for violation of the law and the other by the injured party for damages. Libel, slander and misappropriation of trust funds are good illustrations of acts regarded as torts. Assault and battery is a good illustration of an act that is both a crime and a tort.

Tortoise, *Tor' tus*, a name given to several families of turtles, generally distinguished from true turtles by being more terrestrial in habit and producing harder-shelled eggs. Tortoises are found near rivers and streams in all but the coldest climates, and make their food of frogs, fishes and seaweed. The families are dis-

tinguished by the marks upon the carapace and plastron, the shells which are respectively above and below the body; box tortoises have these two shells united into a nearly complete box, which provides a safe retreat for head and limbs in time of danger. There are six or eight families of tortoises, nearly all species of which are prized for their flesh and for their shells, which are used in the manufacture of fancy hairpins and combs. The terms *tortoise* and *turtle* are often used interchangeably. See **TURTLE**.

Tortoise Shell, a name commonly given to the plates of the shell of the tortoise, particularly to those of the hawk's bill turtle, a species that inhabits the Red Sea and other tropical waters. These horny plates, or scales, are sometimes 18 inches long and one-third as wide, with a thickness of an eighth of an inch. After being cleaned and heated, they are molded and cut into various forms used for ornaments and in the making of combs, cigarette cases, snuff-boxes, etc. Pieces of tortoise shell may be joined together by heating and pressure, using a glue made from the filings of the shell. Horn and celluloid are used as imitations of tortoise shell. See **TORTOISE**; **CELLULOID**.

Tory, the name applied in the American colonies to the adherents of the policy of England, and during the Revolutionary War it was given to all persons suspected of British sympathies. The name was originally a political party name of Irish origin first used in England about 1679, and was applied to those who refused to concur in excluding James II from the throne. The term at last came to signify an adherent of that political party in the state who disapproved of change in the ancient constitution and who supported the claims and authority of the king, Church and aristocracy. The Tories were directly opposed in their ideas and methods to the Whigs, the latter party advocating changes in the constitution in the direction of democracy. In modern English politics the supporters of the Tory Party are known as Con-

servatives and the representatives of the Whigs as Liberals. See **WHIG**.

To'tem, the object which gives its name, as a symbol, to a family or tribe. The totem may be an animal or some other object. There exists a kinship between the individual and this name-giving object, and it is a part of the religion of a semibarbarous people that the totem protects them. An animal represented by a totem must never be killed by the tribe to which it belongs.

Totemism is a form of worship observed chiefly by the natives of Australia and the Indians. Various rites in connection with the totem are performed at the initiation of a young boy into a clan or tribe, and at the time of the death of some member of the tribe. Totemism has also a social value, in that it is forbidden to man or woman to marry one of the same totem. The same strict rule is not observed in regard to consanguinity. The totem pole, a pole decorated with representations of the totem, indicates social standing and is associated with religious rites. Consult Frazer, *Totemism*.

Toucan, *Tou kahn'*, **Family**, a family of birds inhabiting South and Central America exclusively. They are distinguished by their very large, compressed bills, bent downward at the end; they are further distinguished by the bright colors of their bills. Like the cuckoos, to which the family is related, two toes are pointed forward and two backward. The nest is made in holes in trees and two white eggs are deposited. The food is variable, consisting of fruit, insects, reptiles and the eggs and young of other birds. Over 60 species are known, of which the toco is the most familiar. It is 22 inches long, and is black, with yellowish-white throat, neck and rump. The neck is bordered with red, and the bill is orange, with a black spot on the upper mandible. This species extends from Mexico to Argentina.

Touch, one of the five special senses. It has been called the general sense because it is not localized like the sense of sight, taste, smell or hearing. With it

are involved the common sensations of pain and temperature. Certain areas of the skin are most sensitive to pain, others to temperature and still others to pressure. The pressure spots are more numerous than the temperature spots, and the pain spots are more numerous than those of pressure. Some pain spots are more numerous than others. The tiniest particle in the eye can cause intense pain, while certain parts of the face are almost insensible to slight surface irritants. The forehead has perhaps the most acute perception of pressure, the fingers of quality of an object. The sensations of pain, temperature and pressure are also perceived through the same nerves, the sensory, but the nerve fibers of each are provided with different end-organs. These end-organs are of two kinds: touch corpuscles, situated chiefly in the dermis, or true skin, and end bulbs, found mainly in the mucous membranes. The lips, which are part skin and part mucus, are provided with both corpuscles and bulbs, and are extremely sensitive. The tip of the tongue is also very sensitive to touch. Those parts of the body which are least sensitive are the back of the hand, forearm, sternum, back of the neck and middle of the back.

The mechanical apparatus of the nervous system, from which pain, temperature and pressure sensations arise, are fairly complete at birth, and touch is the first sense to become active. Children have a more acute sense of touch than adults, for in them the nerve endings are as numerous as in adults and they have a smaller surface to supply. The touch sense is fine and accurate in the tips of the fingers, and is susceptible of a high degree of cultivation. A highly specialized sense of touch is acquired by some artisans, and the loss of sight necessitates great dependence upon this sense, which tends to develop it to a remarkable degree. Fatigue, a weakened condition of the system, and the habitual use of morphine, or any form of opium, strychnine and alcoholic liquors, destroy the keenness of the sense of touch.

Touch-me-not, Jewelweed or Balsam, a juicy herb of the Balsam Family. It receives its name from the fact that the seed pods explode when touched. The leaves are thin and pointed, with scalloped edges. The flowers are irregular, one division having a tubular spur, curved at the end. They are pale yellow, spotted with brown on the outside and reddish-brown within. Touch-me-not grows wild in the Middle and Eastern states and as far south as Georgia. Its flowers appear from July to September.

Touch'stone", or **Basanite**, *Baz' a nite*, also called Lydian stone because of its occurrence in Lydia, in Asia Minor, a hard, flinty variety of black jasper formerly much used for testing the purity of precious metals, particularly gold. The test can be accomplished by rubbing the metal on the stone; a high percentage of copper causes a reddish-yellow streak, while a high percentage of gold in the alloy makes a yellow marking. This method of testing has been superseded by modern methods of assaying.

Tourmaline, *Toor' ma lin*, a mineral composed chiefly of silica and alumina, which occurs commonly in igneous and metamorphic rock. It crystallizes in the hexagonal system, has a vitreous luster and varies from transparent to translucent and opaque. It may be colorless, green, red, blue or black. The colored transparent crystals are valuable as gems. Brazilian sapphires and Brazilian emeralds belong to the transparent variety. Plates of tourmaline are used as refractors of polariscopes. See POLARIZATION OF LIGHT.

Tour'nament, a form of sport originated during the Middle Ages, in which the knights of France, and later those of Germany and England, displayed their courage and skill at arms, usually on horseback but also on foot, especially if they were dismounted or their horses killed. Combats between two knights were called *jousts*; and many of these occurred during a tournament. But there were also contests between parties of knights. Tournaments were held in large, open spaces called the *lists*, which

were roped off, or surrounded by a railing. Outside of this railing raised seats were provided for many spectators, but especially for the ladies, who were the final judges of each contest. In accordance with the spirit of chivalry which dominated the age, each knight was often the champion of some lady whose colors or emblem he wore into the contests. See CHIVALRY.

Tours, Battle of, one of the 15 decisive battles of the world, fought in 732 between the Saracens, and the Franks under Charles Martel. Four or five years previous to this the Saracens had completed the conquest of Spain. They now decided to extend their conquest northward and invaded Gaul, where they were met on the plains of Tours by the Franks. They suffered an overwhelming defeat and retreated beyond the Pyrenees. Europe was thus saved from conquest by the Moslems.

Toussaint, Too" san', François Dominique, called *L'Ouverture, Loo" ver" tur'*, (1743-1803), a Haitian negro general and liberator. He gained his surname from the results of his valor in causing a gap in the ranks of the enemy. He was born near Cape François, his father and mother both being African slaves, and managed to acquire a scant education. He served with the slaves in their revolt of 1791, subsequently becoming their leader, and, in 1796, three years after the proclamation of freedom to slaves, the French Government made him chief of the army in San Domingo. Shortly afterwards the British general, Maitland, surrendered those strong places which he held on the island, and in 1801 the Spanish forts submitted. San Domingo was thus completely under the sway of Toussaint, who ruled vigorously and well, and, as president of Haiti for life, according to a drawn constitution, developed agriculture and trade. However, during the Peace of Amiens, Napoleon issued a proclamation which reestablished slavery in San Domingo. Toussaint immediately prepared for resistance, but he was obliged to retire before the powerful host which soon ap-

peared under General Leclerc, and was later proclaimed an outlaw. On agreeing to surrender, he was first accorded military honors and then treacherously arrested. He died after ten months' imprisonment in Paris. Despite the many conflicting accounts of Toussaint, it is safe to say that he was of a romantic and imaginative temperament and an organizer and ruler of exceptional talent.

Tow'er, Charlemagne (1848-1923), an American writer and diplomat, born in Philadelphia. After graduating from Harvard and spending four years in European study, he took up law at the University of Pennsylvania and was admitted to the bar. From 1882 to 1887 he lived at Duluth, Minn., where he was president of the Duluth & Iron Range Railroad, and upon returning to Philadelphia, he devoted himself to literary work. Among his productions is his two-volume *The Marquis de La Fayette in the American Revolution*. From 1897 to 1899 he was minister to Austria-Hungary; from 1899 to 1902, minister to Russia; and from 1902 to 1908, minister to Germany.

Tower of London, an English fortress, dating from feudal days, long a government prison and now a government armory and storehouse. It lies immediately east of the city of London on the north bank of the Thames River, and occupies an area of about 13 acres, the whole being surrounded by a broad, shallow moat. In the center of the group of buildings is the famous White Tower, erected by the Bishop of Rochester, in the time of William the Conqueror. Around it stand St. Peter's Chapel, the Jewel Office, the Horse Armory and other buildings. It was once alleged that the Tower was built by Julius Cæsar for the purpose of fortification, but nothing definite can be asserted further than that some kind of a structure occupied the site at the time that William the Conqueror began to carry out his plans. For a long time, until the accession of Elizabeth, it was used as a palace for English kings; later it was the scene of numerous executions for political of-

fenses. It is now in the hands of the war department.

Tow'hee, or **Chewink'**, a bird of the Finch Family, a trifle smaller than the robin. The male is black above, margined with brownish. The breast is white, the wings have white markings and the three outer tail feathers are tipped with white. The sides and rump are brownish. In the female the black is replaced by brownish. The nest is built on the ground or in low bushes and is made of leaves and twigs, lined with grass and rootlets. The four eggs are purplish-white speckled with reddish-brown. The chewink, also called ground robin, frequents fields bordering open woods or the edges of swamps, where it may be seen digging among the fallen leaves for its food, which consists principally of earthworms and insect larvæ. The towhee ranges throughout America from Labrador to the Gulf States and west to the Rocky Mountains.

Towner, Horace Mann (1855-), governor of Porto Rico, appointed in 1923 by President Harding. He was born at Belvidere, Ill. He was admitted to the bar in 1877, and from 1890 to 1892 he was judge of the third judicial district, Iowa. He was a member of the 62d to 67th Congresses, 8th Iowa District, and was a lecturer on constitutional law at the State University of Iowa. In Porto Rico he has given his attention particularly to the expansion of educational facilities and the development of vocational training. He believes that this territory should ultimately become a state of the United States.

Town Meeting, the system of local government of the New England township, which is the oldest as well as the simplest of all known forms of government. In a New England township, the people directly govern themselves. All the male inhabitants of 21 years and upwards are allowed to vote. Once each year, about February or March, a "town meeting" is held at which all the men of the township are expected to be pres-

ent. In early times there was a fine for nonattendance, but this is no longer the case, as it is supposed that a due regard for his own interests will induce every man to come. At these meetings measures relating to the administration of town affairs are discussed and adopted or rejected. Appropriations are made for public expenses, or, in other words, the amount of the town taxes for the year are determined and the town officers are elected for the year.

The principal executive magistrates are the selectmen. They are three, five, seven or nine in number, according to the size of the town. The odd number insures a majority decision in case of differences of opinion. They issue warrants for the holding of town meetings, and they can call such meetings any time during the year when in their judgment it is necessary. The selectmen also lay out highways, impanel jurors, grant licenses, and in many cases act as assessors of taxes and overseers of the poor. In county and state matters they speak for the town, and if it is a case of law they represent the town in court; for the New England town is a legal corporation, and as such can hold property, and sue and be sued.

The town clerk keeps a record of all votes passed in the town meeting, and records births, marriages and deaths in the township, and in some states the transfers of real estate. Every town has also its treasurer, who receives the money for the taxpayers, or whatever money belongs to the town. He pays the public expenses and makes a strict report of them each year. Every town has likewise one or more constables, who serve warrants from the selectmen. They pursue criminals and summon jurors, and serve writs from the law courts. There is also a school committee. The term of the members is three years, one-third being chosen annually. This committee must visit the public schools and make a report to the town every year. Other town officers are the surveyor of highways, sealers of weights and measures, poundkeepers, fence viewers, etc.

The town meeting is, to a limited extent, a legislative body. It can make sundry regulations for the management of its local affairs, which are known as by-laws or town laws. In the selectmen and other special officers, the town has an executive department, and this form of government has been named the most complete democracy in the world. It is the most perfect exhibition of what President Lincoln called "government of the people, by the people and for the people."

Townshend, Toun' zend, Charles (1725-1767), an English statesman. Entering the House of Commons in 1747, he was successively lord of the admiralty,

secretary of war and, despite the wishes of Pitt, chancellor of the exchequer, when he controlled the taxing of the colonies. He supported the Stamp Act and introduced the Townshend Acts, 1767, which made him, above every one except the King, responsible for the American Revolution. Townshend possessed brilliant talents, but he lacked conservatism and foresight. See STAMP ACT; REVOLUTIONARY WAR IN AMERICA.

Townshend Acts, a series of acts passed by the British Parliament in 1767 at the instance of Charles Townshend, then chancellor of the exchequer. The first suspended the New York Legislature until the royal garrisons in the city had been furnished beds, candles, fire, vinegar and salt, as commanded by the Mutiny Act. The second provided for the appointment of commissioners at Boston to enforce the Acts of Trade, while the third laid taxes on glass, red and white lead, wine, paper, painters' colors and tea.

Trachea, *Tra' ke a*, or **Windpipe**, that part of the air passage extending from the larynx to the bronchial tubes. It consists of a fibrous tube lined with mucous membrane and supported by a framework of cartilage. This frame is composed of a succession of imperfect rings, each in the shape of a horseshoe, and arranged one above the other, with their openings turned backward. Along the back wall of this tube extends the part of the food passage called the esophagus, or gullet. The mucous membrane lining of the trachea is covered with several layers of cells. From the layer on the outer surface of the cavity spring a multitude of tiny threads called cilia, which are kept in constant and rapid motion; they lash upward violently and fall gently, sweeping toward the throat the secretion which bathes the surface of the membranous lining and causing it to be deposited in the windpipe, where it is expelled at will. See BRONCHIAL TUBES; LUNGS; RESPIRATION.

Trachyte, *Tra' kite*, a variety of felspar containing glassy quartz crystals. When broken, it presents a rough sur-

face. The color is ash-gray, greenish-gray, brownish-gray and sometimes slightly yellow or red. Some varieties have minute needles of hornblende distributed through them.

Trac'tion Engine, see TRACTOR.

Trac'tor, a powerful engine designed to draw loads or to provide power for other machinery. The tractor developed from the traction engine, a steam locomotive wagon designed to pull heavy loads and deliver power, and the internal combustion engine. The traction engine usually consists of a horizontal boiler with an engine and four wheels, used typically to haul derricks over city streets and to move and drive threshing machines. The development of the automobile-type internal-combustion engine permitted a lighter, more compact and cheaper machine for similar purposes, and this was rapidly developed, largely by manufacturers of farm machinery.

Tractors are of track or of four-wheel type. The former type runs on continuous belts on each side, equipped with treads and lugs. The latter has wide rear wheels to support the machine and lugs to secure traction. Tractors will pull very heavy loads over soft or difficult ground; they are especially useful to the farmer. The track, or caterpillar type was used in the tank of the World War, and is expected to prove a standard item of future military ordnance. The illustration on p. 2915 shows a wheel tractor designed primarily for farm use.

The usual fuel of tractors is kerosene, but some use even cheaper fuels. Speed is regulated by a governor on the engine, which controls the feed of the fuel.

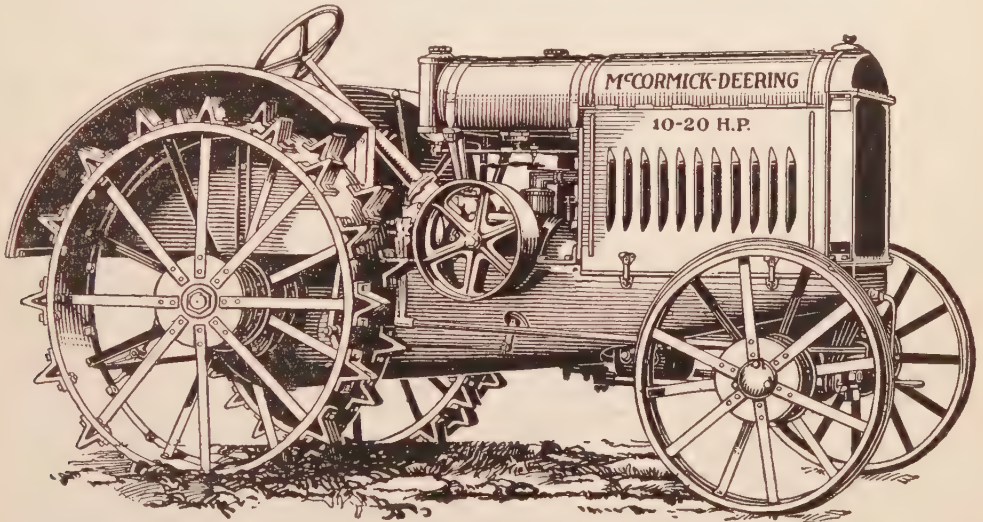
Tractors also deliver power, for saw-mills, threshers, etc., from pulleys which can be run by the engine, and certain types can deliver draft and power simultaneously. See STEAM ENGINE; GAS ENGINE.

Trade-Mark, a special and distinctive mark used by a manufacturer, that the wholesaler, merchant and consumer may be able to distinguish his products from others, and especially from imitations. It must be some invented word, or words,

an emblem, figure, written signature or design, and not calculated to mislead as to the real name, character or origin of the products. Since 1803 the English courts have attempted to prevent the fraudulent use of trade-marks. In the United States they may be registered at the patent office by payment of a fee of \$25, and the right runs for 30 years. This right may be lost if abandoned and clear proof of intention to abandon can be produced. When a business and its good will are sold, the use of its trade-mark usually goes with the business.

the attitude of the workmen in Great Britain prevented their being established there.

In the United States the demand for the trade school has been the outgrowth of the extensive use of labor-saving machinery in all lines of manufacture. This has practically done away with the apprentice system, which enabled a young man to learn a trade by working for a number of years under the instruction of experienced workmen. The largest factories now employ but few skilled mechanics, and they devote their time



TRACTOR: Note the wide rear wheels, which support the tractor in soft soil, and the cleats on the wheels which give traction. The wheel at the side near the foot of the steering-shaft receives a belt and transmits power from the engine to any desired machine. Another popular type of tractor, the caterpillar, runs on a continuous belt passing over both front and rear wheels.

Trade Schools, schools devoted to teaching trades, such as bricklaying, blacksmithing and carpentry for boys, and millinery and dressmaking for girls. Trade schools differ from manual-training schools in that they teach specific trades, while manual-training schools teach the underlying mechanical principles which apply to nearly all trades. Trade schools have long been firmly established in Germany, Switzerland, Belgium, Russia and other European countries, but their development in the United States is of recent origin, and until 1905

to keeping the machines which are attended by unskilled operators in repair. Under present industrial conditions the young workman has little opportunity to become a skilled mechanic or to learn a trade, because he has opportunity to do only one thing pertaining to that trade. To overcome this difficulty trade schools have been established in many manufacturing centers. Most of these schools are private institutions maintained by large firms for the instruction of their employees or by corporations which establish the school as a business

enterprise. Automobile schools for training chauffeurs are a good illustration of schools of this class. In these schools the prescribed course usually includes only such instruction as is necessary to fit the student for his work, while in Europe many of the trade schools lead to entrance to the university and are similar in this respect to the technical high schools in this country.

The New York Trade School, the textile and other trade schools of Eastern cities and the technical high schools of large cities indicate what the public school system is attempting in trade schools. Moreover, various technological institutes and colleges of engineering also make provision for students of various trades. Some of these offer courses for both men and women and have both day and evening sessions. See EVENING SCHOOLS; COOPER UNION; DREXEL INSTITUTE OF ART, SCIENCE AND INDUSTRY; LEWIS INSTITUTE; ARMOUR INSTITUTE OF TECHNOLOGY; EDUCATION, INDUSTRIAL; MANUAL TRAINING.

Trades Unions. See LABOR ORGANIZATIONS.

Trade Winds, the surface winds which seek the tropics to take the place of the warm air that is constantly rising in the equatorial belt of calms. In the Northern Hemisphere the trade winds blow from the northeast, and in the Southern Hemisphere, from the southeast. They are constant and dry and have a velocity varying from 10 to 30 m. an hour. In the days of sailing vessels these winds were of great assistance to ships sailing westward, and from this fact they derived their name. On land they are dry winds and cause deserts, like the Sahara and the great desert of Australia. When the trades come in contact with mountain ranges, they are forced upward, have their temperature reduced and produce heavy rains, as in the case of the Andes, where the eastern slope receives heavy rainfall while the western slope in the same latitude is dry. The belt of the trade winds

is about 50° wide, and it moves north and south with the change of the seasons. See PREVAILING WESTERLIES.

Traf'algar', a low, sandy cape on the southern coast of Spain, projecting into the Atlantic at the western end of the Strait of Gibraltar. It is memorable for the great naval battle fought off its shores Oct. 21, 1805, between the British fleet under Nelson with 27 ships, and the allied fleets of France and Spain under Villeneuve and Gravina with 33 ships. After a terrific contest in which Nelson lost his life the British won a complete victory, capturing 18 vessels and destroying forever Napoleon's naval power. See NAPOLEON I.

Tragacanth, *Trag' a kanth,* a gum procured from many plants of the Pulse, or Pea, Family, and used in medicine as a cure for colds and coughs. The plants are treelike in form and beset with sharp thorns. The leaves and flowers grow in a close-packed cluster upon spinelike branches. The leaves are made up of pairs of oval leaflets which stand out stiff and straight. The gum exudes from the trunk of the tree and, when collected, resembles little, knotted threads or cakes. It is white or reddish in color. Tragacanth is used in calico printing and painting; and elsewhere as a mucilage.

Tragedy, *Traj' e dy.* See DRAMA.

Train'ing Ship, a ship used for training recruits for the United States navy. The number of ships used for this purpose is constantly changing and the particular vessels used are now and then replaced. The old sailing frigate *Constitution*, launched in 1797, was used as a training ship until recently, but, becoming too crowded and not perfectly sanitary, it had its recruits removed. Other training ships are the *Boxer*, a brigantine at Newport; the *Cumberland*, in the Boston navy yard; the *Intrepid*, at Mare Island; and the *Severn*, for the training of cadets at Annapolis, Md. However, the training ship proper does only a small part of the training of the naval cadet. For example, the *Severn*

makes week-end cruises for practice during the academic year, and during the summer the cadets are distributed to various commissioned war vessels for training on the "real ship." In some cases cadets never take any course on a training ship, but go directly to ships where special courses are provided. The *Hancock*, at New York, furnishes courses in typewriting, bookkeeping, etc.; the *Hancock* and *Franklin*, at Norfolk, courses in cooking and baking; the *Franklin* also offers courses in music; submarines are trained in the submarine boats, *Porpoise*, *Shark* and *Pike*, at Newport, R. I. The usual length of the course on the training ship is six months. See NAVY; NAVAL SCHOOLS OF INSTRUCTION.

Tra'jan (about 52-117), a Roman emperor of Spanish origin, succeeding Nerva in the year 98. He was a great general and extended the bounds of the Roman Empire the farthest it reached in all history. His rule was famous for the building of roads and other useful works in the provinces. He founded libraries, and through his efforts thousands of poor children were educated in the cities of Italy. The Christians were slightly persecuted during his reign. He died while returning from a successful campaign against the Parthians. Among his wise acts was the appointment of Hadrian as his successor.

Tram'way". See STREET RAILWAY.

Transcendentalism, *Tran"sen den' tal iz'm*, a term applied in philosophy to any system which emphasizes the intuitive elements, or the creative tendency of the mind, in knowledge. Kant applied the term *transcendental* to those activities of the intellect which are necessary in constructing the world of experience, such as the categories of space, time and causality (not to be confused with his use of *transcendent*, to designate the unknown world of "things in themselves"). His successors greatly emphasized this active principle of intelligence in the idealistic philosophy; and

in the first half of the 19th century Transcendentalism gained a wide influence as the spiritual interpretation of the universe.

These ideas became popular in England, largely through the writings of Coleridge and Carlyle, and passed over to America. Here they inspired the movement known as New England Transcendentalism (about 1830-1850). It is possible, however, to overemphasize the influence of German thought upon this movement. There were other causes and connections. Its character was only partly philosophical, and not so at all in any systematic sense. It was partly economic and social, influenced by European programs of reform, modified by American conditions. It was partly literary, receiving ideas from English writers, and finding expression in the literary activity of its own numbers, notably Emerson, Thoreau and Margaret Fuller. It was partly theological, being an idealistic revolt against both the severe orthodoxy of the old Calvinistic theology and the arid formalism of the newer Unitarian intellectualism; and found expression in the liberal and emotional preaching of William Ellery Channing and Theodore Parker. It was partly mystical, drawing elements from Neo-Platonism and occult Orientalism.

But the movement, as Emerson declared, was primarily spiritual, an American Renaissance, which gathered up and gave expression to the finer sentiments of life in opposition to the formalism, materialism, and commercial and political sordidness and selfishness of the times. It drew together a notable company of congenial spirits, including Emerson, Channing, Parker, Hedge, Ripley, Alcott, Thoreau and Margaret Fuller. The Transcendental Club was organized for fellowship and discussion, *The Dial* was started in 1840 as the organ of the movement, and the community known as Brook Farm (See BROOK FARM) was established in 1841, from which Hawthorne drew material

for his *Blithedale Romance*. The *Journal of Speculative Philosophy* and the Concord School of Philosophy were later developments of Transcendentalism.

The movement was never formally organized, but perhaps for this very reason had all the greater force, since it was left free to reach out as an inspiring and elevating influence into widely diverse fields of thought and activity. It allied itself closely with all efforts for social betterment, and in particular with the abolition movement. See IDEALISM; KANT, IMMANUEL; CARLYLE, THOMAS; EMERSON, RALPH WALDO.

Transform'er, an instrument for converting alternating electric current from low potential to high potential or from high to low potential. The former is spoken of as a *step-up* transformer and the latter as a *step-down* transformer. The common, or core-type, transformer consists of an iron core of laminated soft iron or steel about which are wound two coils of insulated copper wire, the whole usually being enclosed in an iron case for protection. In the step-up transformer, one coil, called the primary, consists of relatively few turns of coarse wire, and the other coil, called the secondary, consists of relatively many turns of fine wire. The electric potential difference on the primary terminals of the transformer is to that on the secondary terminals approximately in proportion as the number of turns in the primary coil is to the number of turns in the secondary coil. And when working on full load, the primary and secondary currents are, with fair approximation, to each other inversely as the numbers of turns in the two coils, respectively. In electric lighting a step-down transformer is used to lower the potential of the current when it passes from the general circuit to the individual buildings for use in incandescent lights. See INDUCTION COIL; ELECTRIC LIGHTING.

Trans'it, the passing of one heavenly body across the disk of another, or across the meridian of any place; but

the term is used most frequently to denote the passing of the planets Mercury and Venus across the disk of the sun. The transits of Venus are especially important in determining the parallax of the sun, and by them, its distance from the earth, which is the unit of measurement for the solar system. As Mercury is nearer to the sun than Venus its transits are more frequent, occurring again Nov. 6, 1914; May 7, 1924; Nov. 8, 1927; May 10, 1937, etc.

The transits of Venus occur at unequal intervals; there will be two transits about eight years apart, then no more occur for more than 100 years, when there will be two more about eight years apart. This peculiar occurrence in pairs is due to the fact that the earth, Venus and the sun must be in a straight line at the time of transit. This occurred last in 1874 and 1882 and will occur again in 2004 and 2012. See ASTRONOMY; ECLIPSE; SUN; VENUS.

Transit, or **Transit Instrument**, a name given to a surveying instrument. It is practically a theodolite, except that it is smaller in size in order to be more portable, and does not contain the refinements in its graduations, being made for coarser and quicker work. It is used principally in railroad surveying. Its chief difference from the theodolite is that its telescope revolves completely around on its trunnions, or horizontal axis, making a transit. An instrument for astronomical work in observatories is similar in construction to the theodolite, except that it is stationary and is provided with a much larger telescope, mounted on a horizontal axis, which is capable of measuring the angles of a transit across the horizon of comets and movable stars. See ASTRONOMY; SURVEYING; THEODOLITE.

Trans'migra'tion, the doctrine of the passage of the soul after death into another body, usually that of some animal. Though generally repudiated in Europe and America, the doctrine is accepted by the Brahmanists and Buddhists of the Orient. The followers of

Buddhism believe that the soul continues to be transferred from one body to another until it attains perfection, when it reaches Nirvana, which is annihilation. The Brahmanistic Hindus believe that the soul finally returns to the common source and origin of all things—Diety.

Trans"-Sibe'rian Railway, the longest continuous line of railway in the world, extending from Kurgan, on the boundary between Asiatic and European Russia, across Siberia and a northern portion of Manchuria to Vladivostok on the Japan Sea. At the west it connects with Moscow and St. Petersburg by means of European lines. The road was begun in 1891 and practically completed in 1902, and covers a distance of 4500 m. A branch 600 m. in length extends from Harbin in Manchuria to Port Arthur.

Transvaal, *Trans vahl'*, a province of the South African Union. See SOUTH AFRICA, UNION OF.

Trap'door" Spi'der, an interesting spider of the Tarantula Family. Like all members of this family, it is dark-colored and hairy, and an inhabitant of warm regions. This spider, like many other tarantulas, digs for its nest a long tube, but it protects it better than its relatives do their nests, for it lines it thickly with silky layers of gauze. The top is closed by an accurately-fitting hinged door, which shuts so tightly as effectually to conceal its location. Occasionally the nest is varied by being tunneled in a form like the letter Y with the stem up. At the branching of the arms of the tunnels a second trap-door shuts off one of the branches. This door is commonly left open, but, if an insect creeps in, the trap is closed, and a meal has been thus easily provided and left in storage. Trapdoor spiders are found in the United States in the western and southern parts.

Trap Rock, igneous rock occupying fissures in other rock and forming a class of veins called dikes. Dolerite is one of the most common of the rock materials occurring as trap. See VEINS.

Travel and Transportation. Men and commodities are very unequally distributed. Over one-half of the people of the earth live upon less than one-seventh of its surface. Moreover, each locality is better adapted to certain industries than to others, and each individual has his special aptitude for some particular occupation. These conditions lie at the foundation of travel and transportation. Many commodities are used far from the localities where they are produced. Man's wants have multiplied with the progress of civilization until the inhabitants of the most enlightened nations require the products of the world to supply their needs. From the time of his advent upon the earth man has been a wanderer, but until he invented means of transportation his travels were limited by his strength and usually confined to a small area, as they are still, among primitive peoples. He bore his burdens upon his head or his back or carried them in his hands. Later he domesticated the ox, the camel and the horse and made these animals his beasts of burden. At first the load was placed upon the animal's back, but man soon discovered that the animal could haul a much heavier load than it could carry, and this discovery led to the construction of the cart and the building of roads. Tribes living near bodies of water learned to float upon logs, and this led to the construction of the canoe, the forerunner of the modern ship.

From these simple beginnings the carrying trade of the world has been developed until it has become one of the largest industries and more far-reaching than any other in its influence. Such inventions as the railway, the steamship, the electric car, the telegraph and the telephone have brought all nations into such close relations to each other that each nation now exerts its influence upon the world, and all great nations have had forced upon them responsibilities that are world-wide. The most advanced nations are those which developed the best methods of travel, transportation and communication and brought them to the high-

est degree of perfection. Therefore, the methods of travel and communication employed by a nation constitute a good index to its civilization. In no other industry are all stages of its development so constantly in use and so closely associated as in that of transportation. Moreover, the carrying trade is just as closely associated with every other industry. "It would be perfectly safe to say that every trade on earth did some specialized work for the traveler." The land, the water and the air are all utilized in travel and transportation.

TRANSPORTATION ON LAND. Toting. The most primitive method of transportation is that of carrying burdens on the head or the back. This method is still in use for general transportation in the interior of Africa and to a more limited extent in all countries. Many special devices for holding the burden in place, such as head bands, shoulder straps and yokes, have been invented to assist the carrier.

Pack Animals. The ox, the ass, the camel, the elephant and the llama are the most common pack animals. Each is used in the locality where it thrives best. The camel, because of its ability to go a long time without water and because of the adaptation of its feet to walking on sand, is almost universally used for travel across the deserts of Africa and Asia (See CAMEL). The elephant is used to a limited extent in the tropical regions of southern Asia, but the large quantity of food required by these animals prevents their being generally used in densely populated regions where all the products of the land are needed to support the people (See ELEPHANT). The llama is the pack animal of the mountainous regions of South America because of the facility with which it climbs steep inclines (See LLAMA). The ass and its near relative, the burro, are generally employed in the mountainous regions of America and the temperate climes of the Old World (See ASS).

The ox is still used as a beast of burden in the central parts of Asia and in some regions in the interior of Africa,

but it is more frequently employed in hauling a vehicle. The horse is seldom used as a pack animal for merchandise, but since its domestication it has carried its master in times of peace and war. Since the age of feudalism the horse has been generally used as a draft animal.

Vehicles. It was soon discovered that the ox and the horse could haul more than they could carry, and this led to the invention of vehicles. Doubtless the sledge preceded the last (See SLEDGE). The first carts were primitive structures, the wheels consisting of cross sections of logs with holes through the center for the axle. Advancement, however, was rapid, and the war chariots of the ancient Egyptians would do credit to a modern carriage maker, and the Romans seem to have used Egyptian models in constructing their chariots. The use of vehicles made the construction of roads necessary and their introduction was slow, and in all new countries pack animals have preceded them. For a long time the only means of travel overland in the American colonies was on foot or on horseback. The first roads followed Indian trails, and even at the beginning of the Revolutionary War carriages were few and used only by the most wealthy. The first line of stagecoaches in the colonies was established between New York and Philadelphia in 1756, and it required three days to make the journey. Previous to the introduction of railways, the transportation of agricultural produce was well-nigh impossible except by boat. Freight wagons resembling the prairie schooner were in use during the War of 1812 and were known as the conistoga wagon.

Improvement in roads led to the improvement in carriages, until the modern carriage, the bicycle and the automobile have been perfected (See AUTOMOBILE; BICYCLE). The countries of Europe, being much older, are far in advance of the United States in the construction of roads, but this country is abreast, if not



THE MAJESTIC, WORLD'S LARGEST SHIP.



MODERN GIANT OF THE RAILS.

in advance of them, in the construction of vehicles.

Railways. The success of the steam railway was assured with the perfection of the locomotive by Stephenson in 1829, and within a few years lines of railway were in operation in various countries of Europe and in the United States. See LOCOMOTIVE; RAILWAY; ELECTRIC RAILWAY.

WATERWAYS. Bodies of water have always afforded cheap and convenient means of transportation, and those nations whose country bordered upon the sea were the first to develop commerce, as well as the earliest to advance in civilization. For a record of progress in travel and transportation on the water, see SHIP; STEAMSHIP.

NAVIGATING THE AIR. The last agency to be used in travel is the atmosphere. The first balloon ascended in the same year that the treaty of peace acknowledging the independence of the United States was signed, but it was more than a century before a successful dirigible balloon was made, and some years later before the aeroplane was invented. Now both of these devices are in regular use. See AERONAUTICS.

Traveler's Tree, a beautiful and interesting tree of the Banana Family growing in Madagascar. Its trunk is made up of the sheathing bases of the long leaves which fall each year. These leaves are long and grow in pairs on opposite sides of the stem, each pair being set closely above the succeeding pair, but at a slightly more acute angle; thus the tree from in front presents a fanlike appearance, but from the side looks peculiarly thin. The tough, stiff leaves are often six feet in length and are grooved in such a manner as to form a trough of considerable size. The rains, pouring into these troughs, fill the bases, where they meet and encircle the stem, forming a reservoir. The thirsty traveler by piercing the bases can procure from each pair of leaves fully a quart of water. As the lower pair of leaves drop off each year, the reservoirs are

higher upon the stem each succeeding season until they may be 30 or 40 ft. from the ground. The flowers, which hang in drooping clusters, are large and showy and the fruit is somewhat banana-like. It is edible and yields a valuable oil. The traveler's tree is a native of Madagascar but two species are grown in conservatories in the United States.

Traverse City, Mich., a resort, industrial city, and port, and the county seat of Grand Traverse County, at the extreme southern end of the west arm of Grand Traverse Bay, an inlet of Lake Michigan, at the mouth of the Boardman River. It is on the Pere Marquette, the Pennsylvania, and the Manistee & Northeastern railroads and on the Dixie Highway. Traverse City is the market for the greatest cherry-growing region in the country and its leading industry is the canning and packing of cherries. There is a cherry festival held annually in July, when the crop is ripe. Among the city's most important manufactures are furniture, cast-iron products, and farm machinery. A state hospital for the insane and a state general hospital are situated here. Traverse City was founded in 1853 and incorporated as a city in 1895. Population, 11,000.

Travertine, a variety of limestone, found as a deposit of springs and streams, whose waters contain an excess of carbonate of lime in solution. It is hard, coarse-grained and usually white or light gray. It is found in large quantities in Italy, and some of the finest buildings in ancient and modern Rome, including St. Peter's Church, have been built from it. It also occurs in Yellowstone National Park.

Travis, William Barrett (1811-1836), an American soldier, born in Edgefield County, S. C. In 1830 he was admitted to the bar at Claiborne, Ala., but he shortly removed to Texas, where he fought for the independence of that territory. Though captured by the Mexicans, he was finally released, and for ten days in February and March,

1836, he commanded the defense of the Alamo, having 140 Americans to 4000 Mexicans. He was killed just before the stronghold fell.

Trawl'ing, a method of fishing common in the North Sea and about the British Isles, but not yet general elsewhere. The *otter* trawl is now found most satisfactory. It is a net 70 or 100 ft. long and somewhat resembling a cornucopia. The powerful, steam fishing vessels of today cost perhaps \$50,000 apiece, while the necessary expenses for their operation may be as much as \$5000 per year. But, with their power, they can draw these great nets mouth open along the bottom of the sea, and thus capture by the million such fish as the cod, haddock, whiting and sole, which abound in deep water. In the North Sea, fleets of 50 or 60 vessels sometimes trawl together over the feeding grounds; and, when necessary, such boats fish at a depth of four, five or even eight hundred fathoms. Trawling is prohibited within three miles of the British coast, lest spawn be destroyed and the fishing industry ruined.

Treadmill, *Tred' mill*", a contrivance used for the punishment of criminals. It consists of a large wooden wheel about 20 ft. wide, having steps arranged around its circumference upon which the prisoner is compelled to walk, supporting most of his weight by a horizontal bar placed above him. The motion is continuous, and is regulated by weights to make the labor more or less severe, and can be stopped only by the officer in charge. The treadmill has never been employed in America, and it is being abandoned generally, except in some English prisons. An endless, moving platform, arranged to drive machinery and on which horses, cattle and dogs are employed to tread, is not properly a treadmill, but an animal motor, and in some sections it is called a horse power.

Treason, *Tre' zun*, that crime which is directly committed against the supreme authority of the State. It is considered the greatest crime that can be

committed. The man who willfully surrenders any knowledge favorable to his country to its avowed enemies jeopardizes the peace and prosperity of all of its citizens. In a republic such as the United States, where the people are sovereign, treason is necessarily confined to levying war against the State, or giving aid and solace to its enemies. Mere conspiracy cannot be called treason, and it has also been held that rebels engaged in an armed insurrection against the United States cannot be convicted for adhering to the enemies, since all involved are citizens, and because their act is entirely connected with their own government. Treason implies the assembling of a body of men for the purpose of overturning or resisting the government by force.

Treas'ury Department, the executive department of the United States Government that has charge of the national finances. The head of the department is the secretary of the treasury, who is a member of the president's cabinet and next to the secretary of state in line of succession to the presidency. The treasury department is the most extensive and complex of all the executive departments. There are three assistant secretaries, two comptrollers of the treasury, six auditors, a United States treasurer, a register of the treasury, a commissioner of internal revenue, a commissioner of customs, a comptroller of the currency and a director of the mint. The department also includes the bureau of engraving and printing, and the marine hospital service. About 5000 officers and clerks are employed.

The treasury department was one of the original executive departments established upon the adoption of the Constitution in 1789, the first incumbent being Alexander Hamilton. The failure of the state banks adequately to protect the government (See BANKS AND BANKING, subhead *History of Banking in the United States*) led President Van Buren to recommend the establishment of an independent-treasury system providing

for a central depository, with subtreasuries in a few of the larger cities. After various vicissitudes this recommendation was enacted into law in 1846 and has proved to be eminently satisfactory in operation. See MONEY; MINT.

Treaty, Tre'ty, an agreement or compact between two or more nations or sovereigns usually for a specified number of years. In the United States the power to make a treaty with a foreign country is vested in the president, but no treaty can become effective unless the Senate ratifies it by a vote of two-thirds of its membership. The president, however, does not in person participate in the discussions with the representative of the foreign power, the negotiations being carried on between the secretary of state and the ambassador or minister of the other country. It is only after their work is completed that the document is presented to the Senate for approval. Treaties are of three kinds, known specifically as commercial treaties; treaties of alliance, offensive and defensive; and treaties of peace. A treaty may supersede state laws within the sphere of action reserved for the states, except that it cannot encroach upon the personal liberty of any citizen, which is guaranteed by the Constitution. In case a treaty is returned without the Senate's approval, but with proposed amendments, it is within the power of the president to proceed to further negotiations, or he may take no further notice of the matter. If such is the case neither the Senate nor other authority can revive the question.

Tree, one of the four great divisions of higher plants and characterized by being a woody plant with a single, more or less stout, erect stem. Each tree is composed of three distinct parts: the roots, which anchor the tree to the ground and take up water and mineral food; the trunk, which supports the crown and carries the food and water ducts; and the crown itself, made up of branches, leaves, flowers and fruit, whose work is that of absorption of air

and moisture, preparation and assimilation of food and reproduction.

The growth of the tree is by two means: the lengthening of the twigs and the thickening of the branches. The first occurs only during the first year of the life of the twig and may be recognized by the rings or nodes formed where the old growth ends and the new begins. The second occurs in a layer of the branch or trunk inside of the bark and outside of the wood of the tree; this layer is called the cambium layer, and forms new wood within and new bark without. Each year's growth of the tree may be discovered by noticing in a cross section the annual rings formed by the cambium, and thus the age of a tree may be known. Often false rings are formed, which have been caused by some accident to the tree, such as the losing its leaves by frosts, fires or insect pests. The false rings are, however, never complete and may thus be distinguished from true rings. The lines running from the center and from the annual rings of the tree to the bark are called the medullary rays and are the lines which form the silver grain of quarter-sawed oak and other woods.

An annual layer, once formed, does not grow any more but becomes darker and harder, and its canals become choked so that the sap does not flow through it; it then joins the central column of the tree, called the heartwood, which often decays away, leaving the tree evidently as well able to grow as before. The growing portion surrounding this is the sapwood, so called because the nourishing sap rises in it. Just what force causes the rise of water in the stems is not known, but how great that force is may be imagined when one considers that the water is ordinarily lifted to a height of 80 or 100 ft. and sometimes to a height of 350 ft.

Trees, like other vegetation, grow more luxuriantly in moist and tropical climates and at medium altitudes; they never grow beyond a certain altitude, which differs in different climates. The

trees of cold regions are mostly pine, or cone-bearing trees; those of the temperate zone are hard woods; and palms are representatives of the tropics. Different common trees are treated under their separate titles. See FORESTRY.

Tree, Sir Herbert Beerbohm (1853-1917), an English actor and theatrical manager, born in London and educated in England and Germany. He began his career in the character of Grimaldi in the Globe Theater in 1878. In 1884 he scored a remarkable success as the Curate in the *Private Secretary*. In 1887 he undertook the management of the Comedy Theater and the Haymarket in London and was successful in both ventures. He visited the United States in 1894 and on the death of Sir Henry Irving he became president of the British Theatrical Managers' Association. He is author of *Fallacies of the Modern Stage* and *The Imaginative Faculty*.

Tree Duck, a bird of the Duck and Goose Family. The fulvous tree duck has long legs and a long neck. The general color is buff-brown; the back and wings are blackish; the stripes along the sides and tail coverts are creamy, and a black stripe runs down the back of the neck. The nest is made either in hollow trees or on the ground near water, where it is well concealed. As many as 30 eggs are laid. These ducks seem to combine some of the characteristics of both the ducks and the geese, especially resembling a goose when they walk on the ground in an erect posture. The fulvous tree duck inhabits western and southwestern United States, Mexico, South America, southern Asia, Africa and Madagascar, being one of the most widely distributed of birds.

Tree Frog. See TREE TOAD.

Tree Mouse. See NUTHATCH FAMILY.

Tree Toad, or **Tree Frog**, a small European frog of the Hylid Family, which lives in trees or at least spends the most of its time there, watching for insects. Tree toads are smaller than common toads, but the males are re-

markable for their loud voices, which are among the earliest signs of spring. Upon the tips of the toes are adhesive disks, secreting a sticky liquid, which aids them in climbing. Though they do not live in the water the tree toads need plenty of moisture. They are remarkable for their peculiar power of changing their color to correspond with the object upon which they are placed, and so render themselves more effectually concealed.

Tre'foil. See CLOVER.

Trent, a river of England, rising on the northeast border of Staffordshire. It flows southeastward to the border of Derbyshire, thence northeastward and unites with the Ouse to form the Humber. It is 170 m. long, and for 120 m. is navigable for barges.

Trent Affair, a diplomatic episode during the Civil War growing out of the seizure by an American vessel on Nov. 8, 1861, of two Confederate commissioners on board the British mail steamer, *Trent*. John Slidell and James M. Mason had been sent by the Confederate Government as commissioners to France and England respectively. They ran the blockade to Havana and embarked in the British steamer. On Nov. 8, Capt. Charles Wilkes of the United States vessel *San Jacinto* stopped the *Trent* on the high seas, sent a searching party on board and arrested the commissioners. They were taken to Boston and imprisoned in Ft. Warren, but were released on Jan. 1, 1862, on demand of the British Government, and permitted to proceed to Europe. This capture of the envoys was applauded by the Northern people, but President Lincoln and Secretary of State Seward strongly disapproved it. The United States Government tendered an apology to England on the ground that the commissioners had been forcibly taken from a neutral vessel on the high seas and in the prosecution of a voyage from one neutral point to another.

Tren'ton, N. J., the capital of the state and the county seat of Mercer

TRENTON

County, 30 miles northeast of Philadelphia and 55 miles southwest of New York, at the head of tidewater and navigation on the Delaware River; on the Delaware & Raritan Canal, which connects through the Raritan River with New York Harbor; on the Pennsylvania and the Reading railroads; and on the Lincoln and other national highways. There is an extensive waterfront with municipally-owned docks, wharves, and warehouses, and a 12-foot channel maintained by United States Army engineers. Mercer Airport, owned by the county, is situated five miles northwest of the center of the city.

Trenton is an important industrial center and is among the country's leading cities in the manufacture of pottery of all kinds—from the commoner ware to fine porcelain and china—rubber goods, wire and cable, and iron and steel. There are also extensive manufactures of machinery, linoleum, incandescent lamps, silk and woolen yarn, hosiery, aerial tramways, automobile bodies, anvils, asbestos fabrics, automatic stokers, battery jars, bedding and spring mattresses, bricks, brooms, crucibles, desks, and many other products.

Trenton has a large number of beautiful parks and playgrounds and many points of historic interest, dating from Revolutionary days and earlier. Cadwalader and Stacy parks are the city's largest pleasure grounds. In the latter park is the old stone Hessian barracks, built in 1758 during the French and Indian War, and near it is the State House. A statue of Washington marks the spot where, after the historic crossing of the Delaware, he surprised the Hessians and took nearly 1,000 prisoners (Dec. 26, 1776). Another noteworthy monument is the Victory Memorial, erected in honor of Trenton men who participated in the World War.

Among the city's educational institutions are the School of Industrial Arts, a non-sectarian, coeducational technical

TRENTON, BATTLE OF

school established in 1914, and a state normal school. Other state institutions include a school for deaf-mutes, a hospital for the insane, a home for girls, and the state prison. The Trenton Municipal Colony is a novel municipal welfare institution which includes a tuberculosis hospital, a home for the aged, a children's hospital, and an isolation hospital.

The first settlement on the site of Trenton was made about 1679, and the place was known as The Falls (from the rapids in the river) until 1719, when it was renamed in honor of William Trent, speaker of the House of Assembly. In 1746 it was incorporated as a borough. It was selected as the state capital in 1790 and was chartered as a city in 1792. In December, 1776, Trenton was the scene of one of the most important battles of the Revolutionary War (See **TRENTON, BATTLE OF**). The city served as the temporary capital of the United States in 1784 and 1793. It adopted the commission form of government in 1911. Population, 136,700.

Trenton, Ontario, a port of Hastings County, near the west end of the Bay of Quinté at the mouth of the Trent River and at the southern terminus of the Trent Canal. It lies about 95 miles east of Toronto and is served by the Canadian Pacific and the Canadian National railways. There are hydroelectric power plants and a number of manufactories, the most important of which are acid and chemical works. The town also has lumber interests, and there are iron mines and limestone quarries near by. Population, 6,000.

Trenton, Battle of, an important engagement of the Revolutionary War, fought at Trenton, N. J., Christmas night, 1776. Washington had just crossed the Delaware, and one body of Hessians had been posted at Trenton and another at Burlington to watch him. Washington decided to attack both these guards, and planned to recross, in three divisions, through the floating ice blocks in the river. Only one detachment, some 2400 men, led by himself, succeeded in crossing, and that after ten hours. With

these, however, he marched south nine miles and surprised the Hessians at Trenton in a Christmas carousal. A short skirmish ensued, during which Colonel Rall and 17 of his men were killed, while the Americans lost two killed and three wounded. Some 1000 Hessians then surrendered themselves. The Americans recrossed into Pennsylvania at once, but occupied Trenton later, on Dec. 30. This brilliant maneuver on the part of Washington infused new life into his forces and, with the victory of Princeton, did much to assure final victory for the American cause.

Trephining, *Tre fine' ing*, or **Trepan'ning**, in surgery, an operation which consists in cutting the skull with a small instrument known as the trepan or trephine, and so relieving pressure upon the brain. The trepan is a delicate, cylindrical saw, fitted with a handle. In using it, the skin and tissues of the scalp are laid back and the trepan placed directly upon the bone; the instrument is carefully turned and a circular section of the bone is cut and taken out with the cylinder. After an operation the piece of bone may be put back and the tissue and the skin replaced, and the wound will heal as in any operation. A trephine is an improved trepan having a sharp, central peg within the cylinder to keep the instrument from slipping; the operation is practically the same with one or the other instrument and is spoken of as trepanning or trephining, regardless of the instrument used.

Tres'pass, in law, a direct and forcible injury to the person or property of another. Assault and battery and false imprisonment are good examples of trespass against the person. The wrongful disturbance or the destruction of another's goods is a case of trespass against property. Trespass against real property consists in wrongful entry upon the land of another, but this does not include entries under prescription or easement; but entering another's house or walking across his grounds without permission constitutes trespass. Even a

creditor may be ordered from the premises by the debtor. Action for damages in cases of trespass are civil actions or torts. See EASEMENT; PRESCRIPTION; TORT.

Trib'une, the title of civil and military Roman officials of differing rank and authority. The most important were those granted by the patricians to the plebeians in 493 B. C., when the latter had seceded from the city because of oppression. To effect a return of the plebeians, the patricians agreed that two plebeian tribunes should be chosen each year. The person of these officers was declared unviolable; they were also given a portion of the consular veto, a right to be exercised only within the city and by the tribunes in person. In consequence of later disturbances the number of tribunes was ultimately increased to ten, while their powers were increased to such an extent that they could bring the whole government to a standstill. They also gained extensive judicial power, having the right to accuse, arrest and fine plebeians, patricians and consuls.

Trichina, *Tri ki' na*, a group of tiny parasitic worms of the group known as Nematoda, or Threadworms. The adults are so small as to be scarcely visible to the naked eye, but they are prolific, and are dangerous because they develop in the muscles of the human body and cause a diseased condition known as trichinosis. They are most abundantly found in the bodies of rats or swine, but in the course of their life history each tiny worm must inhabit the body of more than one animal. The egg is generally laid in the alimentary tract of the animal in which the parent trichina lives; sometimes there are millions of these eggs, and the larvæ which are produced from them bore their way into the muscles, where they lie coiled for a long time. If the animal in whose muscles they live is devoured by another animal, the tiny larvæ are set free during the process of digestion, and they become active in the alimentary canal

of the new host. There they lay their eggs, and the young pass through the same course of development. During their resting state, the muscle which they infest undergoes a kind of fatty degeneration, a symptom of trichinosis. The trichina are taken into the human body by the eating of poorly cooked pork taken from infected swine. Almost all civilized countries have adopted stringent measures for detecting the presence of trichina in meat.

Trieste, *Tre est*, Italy, formerly the chief seaport of Austria-Hungary, situated on the Gulf of Trieste, at the head of the Adriatic Sea. The old town has twisting, stairlike streets on the slopes of the encircling hills and is dominated by an old castle. Along the Corso, just below, are the banks, consulates, and shops. Modern Trieste stretches along the curving shore of the gulf. Here are the open-air museum of Roman antiquities, the university, opened in 1924, and the Tergesteo, which houses much of the commerce and shipping of the port. Trieste has a cathedral, churches of Jesuit, Byzantine, and Greek architecture, and several Roman ruins, among them the Arco di Riccardo, an old Roman arch. The most important city on the Adriatic, Trieste has a vast harbor, extensive shipyards, an arsenal, petroleum refineries, iron foundries, and a number of manufactures. The former Austrian-Lloyd Steam Navigation Company, now the Lloyd-Triestino Company, has its headquarters here. In the World War Trieste was the objective of the Italian drive under General Cadorna, and the Italian army approached within 12 miles of the city. In the adjustment of boundaries after the war the city fell within Italian territory. Trieste was formerly the Roman colony of Tergeste. From 1382 to 1919 it was a part of Austria-Hungary except in the Napoleonic periods, 1797-1805 and 1809-13. It was an imperial free port from 1719 until 1891. The inland republic of Czechoslovakia has rights in the use of the port. Population, 253,000.

Trig'onom'etry, that branch of mathematics which treats of the area of triangles and of the relations of the parts of triangles to each other. It is based upon the geometrical proofs concerning triangles that the sum of the three angles always equals two right angles, and that if three parts of a triangle, one part being a side, are known, the other parts may be computed or may be determined by construction. The relations of any two of the sides of a triangle to each other are said to be the functions of one angle of the triangle, and their value is always the same for the same angle. There are six commonly used trigonometric functions of any angle of a triangle: the sine, which, in a right angle, is the relation of the opposite side to the hypotenuse; the tangent, which is the relation of the opposite side to the adjacent side; the secant, which is the relation of the hypotenuse to the adjacent side; and the cosecant, cotangent and the cosine, which are respectively the reciprocals of the above. In the right triangle ABC, where a, b, and c represent the respective sides of the triangle, these functions are expressed as follows: $\sin A = \frac{a}{c}$; $\tan A = \frac{a}{b}$; $\sec A = \frac{c}{b}$; $\csc A = \frac{c}{a}$; $\cot A = \frac{b}{a}$; $\cos A = \frac{b}{c}$. Trigonometric tables which give the numerical functions of all angles up to those of 90° have been computed with great accuracy and are in common use.

Trigonometry is generally treated in two divisions: plane trigonometry, which deals with triangles lying in one plane; and spherical trigonometry, which deals with triangles upon spherical surfaces. The former is used as the basis of trigonometric calculation and is ordinarily used in surveying when small distances are considered. The latter is used when distances of such length are measured that the curvature of the earth must be considered. See GEODESY.

An illustration of the way in which even elementary trigonometry is of use is in finding the distance across an impassable stream, or the height of the

summit of a mountain above its base. The subject is among the earliest-known branches of mathematics, and its principles have been of incalculable service in astronomy, physics, geology and in all branches of engineering.

Tril'lium, or **Wake Robin**, a familiar spring wild flower of the Lily Family. The stem arises from a short rootstock and bears three green, netted-veined leaves in a whorl just beneath the flower. The flower has three pointed, green sepals curved back, and alternating with these are three white or colored petals, also curved. The fruit is dark red berries. Different species of the trillium are found in moist woods as far west as Minnesota and south to Georgia and Alabama.

The nodding trillium has a drooping flower, and the sessile trillium no flower stem. The painted trillium has white flowers with a crimson inverted V on each petal. This flower is never purple. Probably the large-flowering trillium is the most handsome, being the largest and having the showiest blossoms. It is also the most frequently known in cultivation. Other names for the trillium are Indian pink and birth-root.

Trilobite, *Tri' lo bite*, an important group of shell-covered marine animals, now extinct, that existed in vast numbers in the Paleozoic Age, being the dominant forms of life of the Cambrian System. The trilobite body was elliptical in form, with a hard shell-covered back divided by transverse furrows into three lobes, and varied in length from the 32nd part of an inch to two feet. The animals lived together in groups, some crawling on the sea bottom, some burying themselves in the mud and others swimming freely in the water and feeding on small water animals. Fossil remains of about 2000 species have been discovered. See FOSSILS; GEOLOGY.

Trin'idad', a British West India Island, next to Jamaica the largest of the group, situated near the mouth of the Orinoco River. It is 55 m. long and

40 m. wide, and has an area of 1754 sq. m. The highest mountain ranges reach an elevation of 3000 ft. On the undulating, well-watered plains are abundant fruit and agricultural products. The sugar industry has yielded in importance to that of cocoa. Coffee and coconuts and various kinds of fruits are grown. The pitch lake, La Brea, on the southwestern coast, is famous, and has an annual yield of over 190,000 tons of asphalt (See ASPHALT). The trade with the United States, Great Britain and Venezuela is heavy. The population consists of white sugar planters, coolies and descendants of slaves imported from Africa. Columbus discovered Trinidad in 1498. The Spaniards first attempted to colonize it, and in 1802, in accordance with the Treaty of Amiens, it was ceded to Great Britain. Port of Spain is the capital. Population of Trinidad, about 366,000.

Trinidad, Colo., a city and the county seat of Las Animas Co., 90 m. s. of Pueblo, on the Atchison, Topeka & Santa Fe, the Denver & Rio Grande, the Colorado & Wyoming, the Colorado & Southern and other railroads. The city is an agricultural, cattle-raising, coal and coke region. Sugar beets, alfalfa, frijol and all small grains are grown in large quantities in the irrigated sections. Dry-farming is successfully engaged in. In the city are foundries and machine shops, a wool-scouring mill, bottling works, a powder mill, railroad shop, coking ovens and various manufactories. Large quantities of coal are shipped. Trinidad is regularly laid out on an undulating site and is built on both sides of the river. Picturesque canyon and mountain scenery, including Stonewall Valley, Kit Carson and Central parks and Fisher's Peak, are to be seen in the vicinity. The leading institutions are St. Joseph's Academy, San Rafael's Hospital, a high school, a business college and a public library. Among the notable buildings are an opera house, the Federal Building and a new \$500,000 courthouse. Trinidad was settled in 1853 by Mexican

ranchers; it was incorporated as a town under the territorial law in 1876 and was chartered as a city in 1879. Pop., 1920, 10,906; estimated, 1925, 11,019.

Trin'ity, the Godhead of Christianity, the Father, Son and Holy Spirit. The doctrine of the Trinity was first formulated in the Nicene Creed to oppose the teaching of Arius. The Athanasian Creed formulates the doctrine as follows: "There is one person of the Father, another of the Son and another of the Holy Ghost. But the Godhead of the Father, and of the Son and of the Holy Ghost is all one; the glory equal, the majesty co-eternal." The doctrine, as thus formulated, is not taught directly in the Bible, but suggestions of it are found in the Old and the New Testament. See NICENE CREED.

Trip Hammer, a device used in forging metals by which a hammer attached to the long end of a pivoted lever is made to strike blows rapidly, the short end of the lever being operated up and down by means of a cam on a revolving shaft. Formerly the hammer was lifted up by a rope and allowed to fall by its own weight. Trip hammers are employed principally in forging small articles when a number of light blows are required. They are often used for "striking up" work in dies to form what are known as drop forgings. See FORGE; STEAM HAMMER.

Triple, *Trip'l*, **Alli'ance**, the name by which three different European leagues are known. The first was concluded in 1668 at The Hague, by England, Holland and Sweden, having for its object the checking of the conquests of Louis XIV. The second alliance was concluded in 1717 by England, France and Holland, against Spain. When Austria joined the alliance the next year it became the Quadruple Alliance. The third league was concluded in 1882. This alliance, known also as the Dreibund, had its origin in a dual agreement between Germany and Austria-Hungary, dating from 1879. Each party promised to aid the other in case of attack by Russia, and

guaranteed friendly neutrality in case of an attack by any other power. With the accession of Italy three years later, the dual alliance became the present Triple Alliance.

Trip' oli, or **Libia**, an Italian territory of northern Africa, lying along the Mediterranean Sea between Egypt on the east and Tunis on the west. It is divided into two districts, Tripolitania (540,000 sq. mi.) and Cyrenaica (75,000 sq. mi.), with their respective capitals at Tripoli and Benghazi. The country may be divided into three zones: the Mediterranean, which is suited to agriculture and where wheat and barley, and olives, dates, figs, oranges, and other fruits are grown and stock is raised; the sub-desert zone, which produces the alpha plant, from which cellulose is made; and the vast desert zone, with some fertile oases where olives, alpha, henna, palms, oranges, grapes, and almonds are produced. Sponge- and tunny-fishing are important industries; tobacco is raised and manufactured; salt and phosphate rock are mined; and carpets, leather, gold- and silver-embroidered articles and other products are manufactured. The richer areas are inhabited chiefly by Arabs and the mountainous districts by Berbers. Along the coast are about 43,000 Jews, in whose hands is a large part of the trade. Italians comprise nine-tenths of the European population, which numbers about 30,000.

For centuries Tripoli's prosperity depended on the historic caravan routes which converged here from the Sahara Desert. Today much of the trade has been diverted to the Sudan and Egypt, though there is still considerable commerce by caravan between Tripoli and Central Sudan. Ostrich feathers are brought in quantities from Central Africa for export. There are about 250 miles of railway.

The Carthaginians ruled western Tripoli in early historical times, while Cyrenaica became a center of Greek culture, passed under Egyptian rule, and later became part of Roman Africa.

The country was conquered by the Vandals in the 5th century, A.D., and later was overrun by Arabs. In the 16th century it fell to the Turks, who never established firm authority. It soon became a stronghold of pirates, against whom the United States carried on intermittent warfare in 1801-05. A war between Turkey and Italy in 1911-12 resulted in Italy's gaining possession of the country, when the ancient Greek name of Libia was restored. Population, about 800,000.

Tripol'itan War. See BARBARY STATES, WARS WITH.

Tri'tons, in Greek myths, certain green-haired sea gods; in form, part human, part fish. When so ordered by their father, Neptune, they stilled the waves by blowing their trumpets.

Tri'umph, a procession through Rome in honor of a general who had gained a great victory and had also held the office of dictator, consul or prætor. This was the highest honor any general could obtain, and was granted by the Senate. Before the victorious general went the Senate and the magistrates, the spoils and captives, while his army marched on foot behind him. He entered the city in a chariot drawn by four horses, his face painted red, while the bulla of his boyhood, a charm worn about the neck, was put on again to ward off the many evil glances his success would draw upon him. The procession passed along the Via Sacra to the Capitol. Here a bull was sacrificed to Jupiter and thanks given for the victory. Then followed banquets and other kinds of entertainments. A naval triumph was similar, but on a smaller scale, and beaks of ships and other trophies were used.

Tro'gon, a group of birds related to the kingfishers and the cuckoos, but differing from all others in having the first and second toes turned backward; the feet are rather weak and the tail is usually much elongated. Upwards of 50 species are known, of which 35 are found in South and Central America, 15 in Asia, and two in Africa. The trogons

dwell, for the most part, in the depths of the tropical forests, where they live on fruits, berries and insects. The nests are made in holes in trees, and contain three to four white or bluish eggs. The most familiar member of this family, and one of the handsomest of birds, is the resplendent trogon, or quetzal, which lives in Guatemala. Its plumage is metallic green above and red below. The upper tail coverts are much elongated and droop gracefully when the bird is perching.

Tro'jan War, a contest between the united Greeks and the legendary Trojans in Asia Minor, made famous by the *Iliad* of Homer. The poet says that Troy, the city of the Trojans, was situated at the foot of Mt. Ida, and the Plain of Troy, about nine miles wide, lay between the mountain and the sea. It is now thought that the modern river Mendere is the Homeric Scamander and that the plain is the stretch of land near its mouth. The excavations made by Schliemann are believed to have brought to light ruins dating from ancient Troy.

The tale as told by Homer is that at the height of its prosperity under Priam, Paris, the son of Priam, brought on the destruction of the city by abducting Helen, the wife of Menelaus, King of Sparta, and taking her to Troy. The Greeks collected an army and fleet and under Agamemnon drove the Trojans within the walls of Troy and laid siege to the city for ten years.

In the tenth year of the war the hero Achilles quarreled with Agamemnon, sulked in his ship and refused to take part. The tide of battle was in favor of the Trojans until Achilles, to avenge the death of his friend Patroclus, was again induced to fight, but in spite of the prowess of Achilles and the other heroes, the city could not be taken by assault. The Greeks built a monstrous wooden horse and placed in it a number of the bravest Greek heroes. They then left this horse before the walls of the city and sailed to the Island of Tenedos. After some hesitation the Trojans took the

horse into the city. At night the Greeks within the horse crept out, let themselves down and opened the gates of the city to their comrades, who had returned. A few hours later the city was taken and destroyed.

Trollope, Trol' up, Anthony (1815-1882), an English novelist, born in London. His childhood was exceedingly unhappy and one of constant struggling with poverty. In 1835 he obtained a position in the general post office in London, which he held for 33 years. During this time he began to write novels and produced them with unusual prolixity. He is a realist, depicting with skill and penetration the society of his time. His style is often careless, even slovenly. Humor and pathos intermingle in his novels, and though he laid claim to little psychological insight he has produced characters that are extraordinary and lifelike. His works include *The Warden*, *Barchester Towers*, *The Bertrams*, *Framley Parsonage*, *The Eustace Diamonds*, *He Knew He Was Right*, *The Chronicles of Barsetshire*, *The Last Chronicle of Barset*, *Autobiography*, *Australia and New Zealand* and *South Africa*.

Trolls, Trolze, in Norse mythology, misshapen dwarfs who inhabited the hills and mountains. They were considered to be thievish and were believed to steal children. They were sensitive to noise, for which they had a particular aversion. In modern Scandinavia trolls are considered diminutive imps and goblins having a great propensity for mischief.

Trom'bone, a musical instrument constructed on the principle of a trumpet. It consists of three tubes. The mouthpiece is attached to the first, and the third terminates in a bell-shaped opening. The second tube is double or U-shaped and slides in the other two. The different notes are produced by sliding the movable tube out and in, and thus varying the length of the air column.

Tropic Bird, or Boat'swain, a bird of the Tropic Bird Family. The yellow-billed tropic bird is about 30 inches long,

including the long tail feathers which make up over half this length. The color is pure white, with black marks on one side of the face and the wings. The nest is a hollow in the sand or a crevice of a rock, with sometimes a few leaves or bits of grass. A single brown-blotched egg is laid. The young have white, downy plumage. The tropic birds are essentially birds of the ocean, visiting the land only during the breeding season.

Trotsky, Leon (1888-), a noted Socialist writer, prominent in the second revolution of 1917 in Russia, co-worker with Lenine in establishing the Bolshevik regime, acting as foreign minister for the government. His real name is Leo Bronstein. He was born of Hebrew parents in a small village near Odessa. When a school boy, he spent every moment he could reading books on Socialism. While yet in his teens, he was in Petrograd working for socialism, writing pamphlets and carrying on personal propaganda. In 1905 he was president of the first Soldiers' and Workers' Council.

For this activity he was sent to Siberia. He made a daring escape assuming the name and taking the passport of his jailer, Trotsky, by which he became known. Since he had incurred the displeasure of most governments in Europe, he came to the United States late in 1916 and for two months was one of the editors of a Russian paper in New York. When the Czar was deposed, he returned to Russia and worked with Lenine in establishing Bolshevism.

Troubadour, Troo'ba door, the name applied to the medieval poets of southern France, who flourished from about 1100 to about 1400. Their verses were expressed in the Provençal language which was the first of the dialects produced by the fusion of the Latin with the Northern tongues to receive literary prominence. The Provençal poets had a brilliant career in France and also flourished in Spain and Italy, but their language rapidly declined and their writings are interesting now only as the

productions characteristic of an age of chivalry and feudalism. The troubadours learned their art from no school, for it was handed down from generation to generation. Although many of these poets were of humble or middle-class birth, they included in their number knights, nobles and even kings. See TROUVÈRE.

Trout, a fresh-water game and food fish of the Salmon Family. The body is plump and tapering, with small fins, except the caudal, which is large and fanlike. There is also a fleshy fin located dorsally near the tail. There are several varieties. The brook, or speckled, trout was formerly abundant in all cool streams of the northern part of the United States from Maine to Minnesota and Iowa, but it has been nearly exterminated. The Mackinaw, or lake, trout, is a large species found in the Great Lakes and all large rivers and lakes north. It is a valuable food fish and is propagated by the United States Fish Commission. The black-spotted trout is found in Alaska; the rainbow trout occurs in California and Oregon, and the golden trout in some of the Rocky Mountain streams and lakes. The ouananiche of Canada is a landlocked salmon. All species are favorites with anglers because they are excellent food fish and because of their gameness. See SALMON.

Trouvère, *Troo" vair'*, the name applied to the poets and reciters of tales who flourished in northern France in the 12th century. The language used by the trouvères, which was coming to maturity when the Provençal language of southern France was declining, was given a fixed form by the conquerors of Normandy who settled in that province in the tenth century and who adopted the ancient tongue of the inhabitants. The trouvères originated romances of chivalry, tales of amusement and mystery plays.

Trowbridge, *Tro' brij*, **John Townsend** (1827-1916), an American novelist, born in Ogden, N. Y. After teaching school in Illinois for a year he entered upon a journalistic career in New York and

Boston, and one of his earliest successes was the realistic novel of New England life, *Neighbor Jackwood*. He was editor of *The Yankee Nation* and assistant editor of *Our Young Folks*. The most popular of his books were his wholesome stories for boys, written in a highly interesting manner. His works include *Father Bright Hopes*, *Cudjo's Cave*, *Neighbors' Wives*, *The Jack Hazard Series*, *The Start in Life Series*, *The Tide Mill Series* and *The Vagabonds and Other Poems*.

Troy, or *Il'ium*, an ancient capital of the Troad, near the Mediterranean coast of Asia Minor, southwest of the Hellespont. The historic Ilium, founded by Æolic Greeks about 700 B. C., is thought to occupy the site of the ancient and legendary Troy; for recent excavations by Dr. Schliemann, in the Troad, have unearthed, almost conclusively, the Troy which Homer celebrated in his *Iliad*. See TROJAN WAR; HELEN; PARIS; AGAMEMNON; ACHILLES; ULYSSES; HECTOR; WOODEN HORSE.

Troy, N. Y., a manufacturing city and the county seat of Rensselaer County, six miles northeast of Albany at the head of tidewater navigation on the Hudson River, opposite the mouth of the Mohawk River, and on the New York Central, the Boston & Maine, and the Delaware & Hudson railroads. It is at the junction of the New York State Barge Canal, which connects it with Buffalo and the Great Lakes, and the Champlain Canal, which links it with Lake Champlain and Canada. The federal dam in the Hudson is opposite the city. Cohoes, Watervliet, Waterford, and Green Island are connected with Troy by bridges.

Troy is the "collar capital" of the United States, for in its factories are made 90 per cent of the country's output of men's collars. The detachable laundered collar was invented here in 1819 and a large group of collar and cuff manufactures has grown up. Special machinery is made for them in the city. Troy is also the original home of the steam laundry. Among the other

important products are metals and machinery, textiles, clothing and millinery, paper goods, paper, and printed matter, furs, leather and rubber goods, tobacco, chemicals, oils, and paints, wood products, stone, clay, and glass.

The most prominent educational institutions are the Emma Willard School (girls, non-sectarian), established in 1814, the Rensselaer Polytechnic Institute (men), established in 1824, and the Russell Sage College (women), established in 1916. There are several orphan asylums and other charitable institutions.

Troy was founded by the Dutch in 1630. Its original name was *Pafraets Dael*, meaning "lazy man's paradise." Kiliaen Van Rensselaer acquired absolute right to the property now known as Troy, and his name is perpetuated in the name of the county. The present name of the city was adopted in 1789, and the place was incorporated as a city in 1816. Population, 72,300.

Troyon, *Trwa-yon'*, **Constant** (1810-1865), a French painter, considered by many critics the foremost animal painter of modern times. He was born at Sèvres. He first attained success as a landscape painter, but after a visit to Holland in 1847 devoted himself to the painting of animals. Among his most celebrated works are *Return from the Farm*, *Oxen Going to Work*, *The Goose Girl*, and *White Cow Scratching Herself*. There are 31 examples of his work in the Louvre, 7 in the Art Institute of Chicago, and he is represented in many other collections.

Troy Weight. See **WEIGHTS AND MEASURES**.

Truce of God, an edict of the Church issued in 1041 setting a limitation to private warfare. For nearly a century after the death of Hugh Capet there was no strong central government in France. The nobles began to make war against each other, and conditions became intolerable. The Pope proclaimed the Truce of God, which prohibited all fighting between Wednesday evening and Monday

morning, and on all feast days in Advent and during Lent. While the edict did not wholly stop war, it restricted it.

Truf'fle, an underground fungus which grows in the vegetable mold of forests and under decaying leaves. The fruiting bodies are tuberlike balls formed underground, and constitute the part generally known as truffles. Several species are edible and are highly prized for seasoning, since they have a spicy taste and odor. Most of the supply is grown in France, where pigs and dogs are trained to scent out the hidden fruit. Truffles are sometimes known as earth-nuts.

Trum'bull, John (1756-1843), an American painter, born in Lebanon, Conn. Among his numerous productions are portraits of prominent Americans, and illustrations of events in American history. He gave a notable collection of portraits and historical paintings to Yale University. In 1817 he was commissioned to paint several subjects for the Capitol at Washington. These include *The Declaration of Independence*, *The Surrender of Cornwallis* and *The Surrender of Burgoyne*.

Trump'et, a musical wind instrument. It consists of a brass or silver tube about eight feet long and bent in the form of a parabola, with a cup-shaped mouthpiece at one end and a bell-shaped opening at the other. The trumpet is one of the oldest musical wind instruments. Its tones are characterized by great power and brilliancy.

Trumpet Creeper, a woody, climbing vine of the Bignonia Family and common in all parts of the United States. The vine climbs by means of little rootlets put forth along the stem. The leaves are composed of from 5 to 12 oval leaflets, which have finely-cut margins. The flowers grow in clusters and are long, funnel-shaped tubes, orange or scarlet in color. The fruit is a flattened two-celled pod. The trumpet creeper grows wild from Pennsylvania south.

Trustee, a person to whom property is committed to be held in trust for the benefit of some individual or for

public use. Trustees are usually provided for in wills for the purpose of holding property in charge for minors, and for the widow to whom the estate falls by dowry and inheritance. The party in whose interest the trust is held is called the beneficiary. One is not bound to become a trustee, but if he once accepts he cannot release himself from the obligation except by provision in the deed of trust or by permission of the court. The trustee is liable for misuse or misappropriation of trust funds and for all interest or profits arising from their investment. He is required to exercise the same care in the administration of trust funds as he would in administering his own funds. Violation of orders of the court or wrongful use of trust funds by the trustees is regarded as a criminal act in most states. Banks and trust companies as well as individuals may act as trustee.

Trusts, those combinations of individuals or corporations which have, or seem to have, for their object, securing a monopoly in some line of industry. Trusts are the outgrowth of industrial evolution, and the organization of corporations was the first step in their formation. Trusts are formed in different ways. At first the trust consisted in merely binding together a number of corporations engaged in the same industry, as the manufacture of woollens, by an agreement to maintain uniformity in selling prices, the payment of wages and possibly the division of territory. This form of combination was soon found defective and a second one was instituted, under which the stockholders of the various corporations place their stock in the hands of a board of trustees, giving to these trustees irrevocable power to vote the stock as they see fit or as instructed when the trust is formed. This form of combination was declared illegal by the United States courts. The third plan consists in the formation of a new corporation, which buys the stock of the corporations interested. These corporations then dissolve. Still another method and one in

general favor is to form a corporation which shall own all or a majority of the stock of the subsidiary corporations. The separate companies are then technically operated independently. The dividends are paid to the central corporation, through which the stockholders receive their individual dividends.

ADVANTAGES. The following advantages are claimed for trusts: (1) saving the expense of raw material and machinery by purchasing in large quantities and at opportune times; (2) combining several plans under a single management and thus reducing the number of clerks and supervising employees and proportionally reducing the expense of manufacture; (3) turning by-products which small concerns usually waste, into valuable products; (4) greatly reducing selling expenses; (5) by controlling the output, maintaining a uniformity of price; (6) control of the output also causes a steady demand for the product, which assures the workman regular employment at a uniform wage, thus relieving employees of uncertainty and tending to do away with labor troubles.

DISADVANTAGES. Notwithstanding the advantages claimed for them by the advocates of trusts, the public at large views them with suspicion and often with disapproval. Those opposed to trusts bring the following charges against them: (1) that the manipulation of stocks by promoters and directors for their own benefit often causes serious loss to the investors; (2) loss to wage earners ensues, through the power to force wages down, which a large corporation can exercise where a small concern cannot; (3) the abolition of competition results, which enables the trust to maintain a higher price for the product than would otherwise be possible, an unjust burden which the consumer must bear; (4) the power exerted by trusts to corrupt legislators and to evade law, works injustice to the public and leads to disrespect for all laws.

CONTROL. In 1890 Congress passed what is known as the Sherman Anti-Trust Law, a measure enabling the Na-

tional Government to control in a measure those corporations whose business is interstate in its scope. This law makes any combination in restraint of trade illegal, but the law is somewhat indefinite, and its enforcement has been attended with numerous difficulties. However, its influence for good is beyond doubt. In 1911 the Standard Oil Company of New Jersey and the American Tobacco Company were compelled to dissolve as the result of prosecution under this law. Laws requiring publicity and inspection by government inspectors are also effective in controlling large corporations. The statutes of the various states, by limiting the amount of capital which corporations may employ, by making certain combinations illegal and by compelling corporations to keep their business within the limits of their respective characters, are doing effective work in controlling trusts.

Canada has a law which is remarkably effective. It provides that upon the application of six citizens who complained against a corporation a judge may order that a commission of three be named to investigate the corporation and render a decree. This commission has the powers of a court, and its report must be accepted by the corporation within ten days under penalty of a fine of \$1000 a day for further delay. The law also provides that protective duties may be removed and that patents used in restraint of trade or to raise prices may be revoked.

Trypsin, *Trip' sin*, a ferment found in the pancreatic juice. It is a solvent of starch proteid and fat. It is a very important agency in digestion. See DIGESTION; STOMACH.

Tschaikovsky, *Chi kauf' ske*, **Peter Ilich** (1840-1893), the greatest composer Russia has produced. He was born in the village of Votkinsk in the Ural Mountains, and after studying law and holding public office he turned his attention to music and completed with distinction his course of musical study at the Conservatory of St. Petersburg, of which Anton Rubinstein was direc-

tor. He accepted, in 1866, the position of teacher of harmony in the University of Moscow. He died in St. Petersburg, after a brief illness, of cholera. Tschai-kovsky suffered much from opposition and lack of recognition at home, and America was one of the first countries to pay him honor. He was a man of broad, cosmopolitan culture, and was often accused of lack of patriotism; but Russian themes are everywhere to be found in his works revealing his intense nationalism. A list of a dozen of the world's greatest composers would undoubtedly include the great Russian.

Tschaikovsky's claim to immortality rests upon his symphonic poems, among which *Manfred*, *Romeo and Juliet*, *The Tempest* and *Francesca da Rimini* show him at the pinnacle of his powers. His operas include *Eugene Onegin*, an enduring work of art, *The Maid of Orleans*, *Mazeppa* and *Iolanthe*. Among the other noteworthy productions are songs, of which there are over a hundred; symphonies, including the famous *Pathetic*; concertos; overtures; chamber music; and several charming ballets, among them *The Sleeping Beauty* and *The Lake of Swans*.

Tset'se, a harmful insect of the order Diptera, found only in tropical Africa. In 1902 it was discovered that this insect is the carrier of the dread sleeping sickness so widely spread in Africa. The tsetse flies, which are much like the gad-flies of the United States, are born alive and spend their larval and pupal stages in the ground. In the adult state they infest the woody tracts near lakes and streams and may be driven away by the destruction of their haunts. Since sleeping sickness is easily spread, causes great suffering and is apt to terminate fatally, the destruction of this pest is a matter of importance. The bite of the tsetse fly is often fatal to horses, cattle and dogs, and for this reason these animals cannot be successfully raised in regions where the fly is common.

Tuber'culo'sis, or **Consump'tion**, a highly infectious and widespread disease, which causes a great number of

deaths, especially among young people. It has been known from early times, and was accurately described by Hippocrates (about 400 B. C.), but the cause of the disease was not known until 1882, when the tubercle bacillus was discovered by Koch. The bacillus is an exceedingly minute body, visible only under a high-power microscope. With the discovery of the cause, it has been possible to take measures for preventing the spread of the disease, but, notwithstanding the systematic efforts to eradicate it, the malady is universal and no race is exempt, though some races are more susceptible than others.

While tuberculosis of the lung is the most common form of the disease, tuberculous conditions may occur in various parts of the body and give rise to sores. Discharge from these sores, or from the lungs, in the form of sputum, or spit, contains large numbers of the germs, which should be destroyed by burning or by chemicals. Spitting on the streets of cities or in other public places by persons having tuberculosis is a common cause of the spread of the disease, as the germ loses none of its power by drying, but may be blown about in the air and find lodgment in the lungs of some susceptible person, who will fall a victim. Fortunately most persons are practically immune, but the underfed, overworked laborer, accustomed to bad air, is often unable to offer resistance. In any case it is the weakened and delicate body that is subject to the disease.

Tuberculosis has been thought to be hereditary; but the best authorities now seem to hold to the belief that a tendency to the disease may be inherited, but that the disease itself is not transmitted by heredity. In the early stages it is possible to overcome it by living out-of-doors, in order to have all the sunshine and fresh air possible, and by having wholesome, nourishing food and complete rest. In some cases surgery is successfully used.

Tuberose, *Tube' rose*", a cultivated plant of the Amaryllis Family and a native of Mexico. It has a straight,

unbranched stem arising from a tuber, as do most of the leaves. The flowers, which grow on a spike, are heavily scented, cream-white and often double. Its name, which is derived from its having a tuberous underground stem, has been corrupted to *tube rose*.

Tucson, *Too son'*, Ariz., a resort and distributing center and the county seat of Pima County, 100 miles southeast of Phoenix, on the Santa Cruz River and on the Southern Pacific Railroad. The Southern Pacific of Mexico, of which it is the northern terminus, connects it with Mexico City. Tucson has a municipal airport. It is the second largest city in the state and is situated in a mining, agricultural, and grazing region. It is the center of one of the richest copper-mining districts in the world. Lead mining is also important. It is an important cattle market and has machine shops, flour mills, railroad shops, a cotton-seed-oil mill, and brick yards. Tucson lies 2,400 feet above sea level and is noted as a health resort.

The older section of Tucson has the appearance of a town of Old Mexico, but the newer portion contains handsome modern buildings. One of the oldest and most interesting of missions is San Xavier del Bac, lying nine miles south of the city. It was founded in 1687, and is in splendid condition today. Tucson is the seat of the University of Arizona, of the Carnegie Desert Laboratory, of the Arizona Home School, and of Evans School for Boys. It has a state children's home and a state school for the deaf and blind. It is also the seat of a Roman Catholic bishopric. The Desert Sanatorium of Southern Arizona is situated six miles northeast of the city.

Tucson was an Indian village until 1776 when the Spanish presidio at Tubac was removed to the site. It was an important trading post when the Gadsden Purchase was consummated with Mexico in 1854, and until 1890 it was the site of a United States Army post. It was the capital of the Terri-

tory of Arizona from 1867 until 1877. It was first incorporated in 1877 and was incorporated as a city in 1893. Population, 27,500.

Tu'dor, House of (1485-1603), the surname of an English royal family. Tudor is the Welsh equivalent of Theodore. The founder was a Welsh nobleman who married Catharine, the widow of Henry V, in 1423, and fought for the Lancasters during the Wars of the Roses. His son Edmund, Earl of Richmond, married Margaret Beaufort, a descendant of Edward III through John of Gaunt. The son of this union became Henry VII, who, by marrying the daughter of Edward IV, united the warring houses of Lancaster and York. He reigned from 1485 to 1509, and was succeeded by his son, Henry VIII (1509-1547), who was succeeded in turn by his three children, Edward VI (1547-1553), Mary (1553-1558) and Elizabeth (1558-1603), who was the last of the Tudor sovereigns. The Tudor reigns were noted for the attempt to exercise absolute power. Their rule covers the period of the Reformation and the establishment of the independent English Church.

Tuesday, Tuzé' day, the third day of the week, named from the Anglo-Saxon god of War, Tiu.

Tufa, Too' fa, a name applied to the porous rock deposits about the craters of volcanoes and mineral springs. They are composed either of silica or of lime. Calcareous, or lime, tufa is formed by the deposition of water, which has held in solution a large quantity of carbonate of lime. The deposit often contains leaves, twigs and other forms, about which the formation has accumulated. The accumulations of scoria and ashes from volcanoes are cemented into a solid mass by the lime or silica present. The color is usually of a brown, gray or of a yellowish tinge, but it is sometimes red.

Tulane University of Louisiana, at New Orleans (1845). A medical college, organized in 1834 as a private enterprise, was included in the University

of Louisiana by action of the State Legislature in 1845. The law school of the university opened in 1847 and an academic department was developed into a college in 1851. Closed during the Civil War, these three departments were later reopened, and in 1879 the state appropriated \$10,000 per year for the institution. But in 1884, following large gifts by Paul Tulane, a former resident of New Orleans, the General Assembly granted the institution a new charter under its present name. Tulane University comprises a teachers' college, the colleges of arts, sciences and technology and Newcomb Memorial (for women), and the departments of law and medicine. It maintains a large summer school. The university is nonsectarian and a quasi-state institution, maintaining one scholarship for each legislative and senatorial district of the state. It is open only to whites. The gifts by Paul Tulane exceeded \$1,000,000, to which others have added large benefactions. The university has a beautiful and well-located campus of 100 acres, fine buildings, a library of about 125,000 volumes and an endowment of about \$8,000,000. It enrolls 4500 students and nearly 1000 more for its summer session. Newcomb Memorial College, the department for women, was opened in 1887. With an endowment of about \$3,000,000 and an enrollment of about 500, it ranks among the best of American colleges for women. See LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE,

Tu'lip, a cultivated spring plant of the Lily Family and a native of the Old World. Its flat, stemless leaves proceed from a bulb; the flower stalk is leafless and bears a single, large flower having six bright-colored sepals, which are red, yellow, pink or variegated in color. The flower has a lemony fragrance and is a greenhouse and garden favorite. Tulips are sometimes grown from the seed but more often from the bulb, which, when planted in the autumn, produces its leaves and blossoms in the early spring season.

The Mariposa lily, named from its being found in the river valley of that name in central California, is, in reality, a tulip. It is found wild in all the Western States from Washington to Mexico and may be a woodland, meadow or hill-side plant. The flowers are of many colors, and, like the tulip, are erect or sometimes nodding, on a leafless stem. In color they are white, red, lavender, purple, brown or yellow. Their profusion and attractiveness make them great favorites in the West.

Tulip Tree, a handsome, straight-trunked tree of the Magnolia Family, found in the United States from the Atlantic coast to the Mississippi River. Its cylindrical column often attains a diameter of 8 or 10 ft. and does not vary from this size until about 80 to 100 ft. above the ground. The bark on young trees is thin and on mature specimens becomes thick and rugged. The leaves have almost square bases and three sharply-pointed lobes separated by rounding incisions; the middle lobe has a well-marked, V-shaped notch, having its vertex at the midrib. The leaves are long-stemmed and sheathed at the base until they are of fairly good size; probably their rustling in the wind is the reason this tree is often mistaken for the poplar and so called yellow poplar.

The flowers are large and tuliplike; they have three yellowish, spreading sepals and six nearly erect petals, which are greenish-yellow on the outside and orange-colored within; at the base of the stamens is a green, starlike marking. The scaly, dry fruit ripens late in September or in October, is conical in form and remains on the tree through the greater part of the winter. The wood is valuable for cabinetwork and interior finishing and is used to some extent in making woodenware, shingles, brooms and boats. The bark produces a bitter medicine used as a heart stimulant.

The tulip tree rarely grows in groves but is found in company with other trees, as the maple, elm and beech. It is also frequently planted as an ornamental shade tree. It is locally called

whitewood, hickory poplar, canoe wood and saddle tree, and is found in China as well as in the United States.

Tulsa, Okla., an oil center and manufacturing city and the county seat of Tulsa County, 218 miles south of Kansas City, Mo., on the Arkansas River and on the St. Louis & San Francisco, the Atchison, Topeka & Santa Fe, the Missouri, Kansas & Texas, and the Midland Valley railroads. It has a Class A municipal airport and is a commercial aviation center. Tulsa lies in the heart of the mid-continent oil field, and the manufacture of petroleum products is the city's largest industry. Other products include derricks, rigs, and tanks, oil-field supplies, food products, foundry and machine-shop and other metal products, brick, tile, and building materials, and chemicals. There are also large railroad shops. Natural gas and coal deposits in the vicinity furnish fuel for the city's industries. Tulsa is the seat of the University of Tulsa (Presbyterian), formerly Henry Kendall College, established in 1895 and removed to Tulsa in 1907. A feature of the city is Mohawk Park, a municipal park of more than 2,200 acres. Tulsa was settled in 1887, and was a cattle town before oil was discovered. It became a city in 1902 and is governed under a revised charter of 1908. Population, 150,000.

Tum'blebug, a widely distributed scavenger beetle of the Scarabæid Family. It may be known by its broad-ridged body, horny beak, rakelike claws and its habit of rolling up a mass of refuse matter into which an egg is deposited. These balls are buried in the ground, and there the egg hatches into a fat, white grub, which feeds upon the decaying matter stored about it. The adult beetle is hatched in two weeks from the time the eggs were laid. The tumblebug is of aid to man as a scavenger. See SCARABÆUS.

Tu'mor, an abnormal growth characterized by rapid multiplication of the cells constituting some substance of the body, and giving the outward appear-

ance of puffiness or swelling. There are two chief classes of tumors: malignant tumors, which terminate fatally; and nonmalignant, or benign tumors, which are usually painless and harmless, and which occasion little inconvenience except that arising from their size. The nonmalignant tumors may be removed by a simple surgical operation, but the growth is apt to reappear. See CANCER.

Tu'na, **Scad**, or **Tun'ny**, an important game fish of the Mackerel Family. It is found in all warm seas and is known for its size, its great activity and the oily, agreeable flavor of its flesh. There are three common species. The long-finned tuna is a plump fish with slender, pectoral fins which it carries at an angle of 45°. It is seen near the coasts of southern California in the spring, and is eagerly sought by enthusiastic anglers. Its average length is two to three feet and its weight from 12 to 70 lb. The long-finned tuna is often called the albacore. The yellowfin tuna is a brightly-colored Japanese fish which has been successfully propagated in California waters. Its name is given because of the long, yellow dorsal fin. The leaping tuna is the scad, or horse mackerel, of the New England States, the tunny of the southern Atlantic and the tuna of the West. It is found in the waters of southern Europe, along the Atlantic coast of America and, in large quantities, near the shores of the Santa Catalina Islands. This tuna has a broad, tapering body, which is terminated by a broadly-forked caudal fin. Near the tail upon each side of the body are small, spiny projections which are evidently degenerate fins. This species is called the leaping tuna because it can rise into the air in a perfect curve, whose highest point is sometimes ten feet above the surface of the water. The fishermen of California take especial delight in capturing the tuna because of its gameness.

Tundra, *Toon' dra*, a term used to designate the swampy areas of the Arctic regions of North America, Europe and Asia. At a depth of a few feet the

ground is frozen throughout the year, but the surface soil supports abundant vegetation in the summer season, which is gradually building up the land to higher levels. In summer the tundras form a continuous morass, visited by wild birds and made beautiful in parts by flowering plants; in winter they are a desolate waste of snow and ice. Valuable remains of extinct animals have been found in the region, some of them in an excellent state of preservation, due to the underlying ice sheets.

Tung'sten, or **Wolfram**, a chemical element discovered in 1781 but considered useless until about 1895. It is never found free in nature but always in combination with lead, iron and manganese, and the chief sources are Colorado, Cornwall, Bohemia and Chile. Tungsten is a hard, lustrous metal, steel-gray in color and very brittle. It is becoming especially useful as an alloy for steel; by its addition the hardness of steel is greatly increased. In European countries steel so treated is used as a coating for the armor plates of battleships. Tungsten is also used for the filaments of incandescent lamps because of its electrical conductivity and its high melting point. As a mordant for dyes to render colors fast; and as a solution for making garments fireproof, its salts have proved valuable.

The most remarkable deposit of tungsten is that upon the famous "Tungsten Farm" of Colorado. Formerly the only deposit known in the United States was that of Arizona, but in 1900 an Arizona prospector traveling through Colorado saw a quantity of the ore upon the surface of the ground. Upon examination he discovered that for miles around the ground was covered with the valuable deposit. He immediately staked out his claim and literally picked up tungsten for shipping. This "Tungsten Farm" is located in Boulder County, Colo., and is said to be the purest deposit in the world. Since its discovery the price of tungsten has gone down until it is available for wide commercial use.

Tun'nel, an artificial underground passage or roadway. The construction

of tunnels is of ancient origin. A number of rock-cut tunnels leading to the tombs of the ancient Egyptians have been found. Similar tunnels were made by the Nubians and by the Aztecs, but the Romans were the greatest tunnel builders of ancient times. Their tunnels were designed for aqueducts or roads and some of them are still in use.

Modern tunnels are connected almost entirely with railway construction and are cut through mountains or under streams. Among the greatest tunnels in the world are those through the Alps, the Mont Cenis, 7.6 m. long; the St. Gotthard, 9.25 m. long; and the Simplon, 12.25 m. long. In the United States the most noted tunnels are the Hoosac at North Adams, Mass., 4.75 m. long; the Stampede, on the Northern Pacific Railway; the Cascade, on the Great Northern Railway; and the tunnels under the Hudson and East rivers at New York. Two of these tunnels are used by the Pennsylvania Railway to bring its trains into New York and Brooklyn, and the others by electric lines.

Tup'per, Sir Charles (1821-1915), a Canadian physician and statesman, born in Nova Scotia and educated at Horton Academy and Edinburgh University. He began to practice his profession in his native county. In 1855 he entered public life in the Nova Scotia Assembly, and two years later he became provincial secretary, from that time until 1867 being the most prominent figure in local politics. Meanwhile, in 1864, he succeeded to the premiership. Later, in 1870, he became president of the Privy Council of Canada, and he subsequently was successively minister of inland revenue, of customs, of public works, of railways and canals and of finance; from 1884 to 1887 and after 1888 he represented Canada as high commissioner in London. In January, 1896, he entered the Bowell administration as secretary of state and leader in the House of Commons, four months later succeeding Sir Bowell as prime minister of Canada. Sir Charles Tupper, who was knighted in 1879, next to Macdonald, probably, did

more than any other man to bring about the Canadian Confederation.

Tupper, Sir Charles Hibbert (1855-), a Canadian statesman, second son of Sir Charles Tupper, born in Nova Scotia and educated at McGill and Harvard universities. A leader of the Canadian bar, he has practiced law at Halifax and at Vancouver. From 1882 until his retirement in 1904 he sat in the House of Commons, meanwhile serving successively as minister of marine and fisheries, as minister of justice, as attorney-general and as solicitor-general. His distinguished services as agent for Great Britain in the Bering Sea Arbitration, at Paris, early in 1893, led to his being knighted that same year.

Turbine, Tur' bin, Wheel. See WATER TURBINE.

Tur'bot, a group of fishes of the Flatfish Family. It is a large fish having the peculiar, twisted cranium of all members of the family; its body is oval in form and compressed and nearly surrounded by the long, continuous dorsal and ventral fins. The caudal fin is long and rounding. The European turbot is, in England, considered one of the most excellent food fishes and is imported in large quantities from Holland, where the most extensive turbot fisheries are located. The spotted turbot, or watery flounder, is taken in the waters of the New England coast, and though not found in great quantities is much prized for the table. The largest turbots weigh about 20 pounds.

Turgeniev, Toor gen' yef, Ivan (1818-1883), a Russian novelist, born in Orel. He was a brilliant student at the universities of Moscow and St. Petersburg, and completed his education at Berlin, where he was happy in the free intellectual life of Europe, and grew to be one of the most highly educated modern men of letters, as well as one of the most cultivated. During the last years of his life he lived chiefly in Germany, then in Paris, where he died. There was a gentleness, refinement and humility about this gray Russian giant—for he was a man of noble stature—that ever

suggested the genius of a truly great man. His was the pessimism of the Slav, a temperamental religious disbelief, a shaken faith in the goodness of life because he had witnessed so many of its ills. He was an uncompromising realist, writing almost perfect Russian prose; a poet at heart, working with high seriousness and revealing more of human nature in less space than any other novelist in the whole world. His fame rests on the works *Yakoff Pasyunkoff*, *Rudin*, *Faust*, *Asya*, *A Nest of Nobles*, *On the Eve*, *Fathers and Sons*, *Smoke*, *Virgin Soil*, *Hamlet and Don Quixote*, *Clara Militch and Prose Poems*.

Turgot, Tur" go', Anne Robert Jacques, BARON DE L' AULNE (1727-1781), a French statesman, born in Paris. Descended from one of the oldest Norman families, he was destined for the Church, but took up law by preference. In 1761 he was appointed intendant at Limoges, where for 12 years he exerted himself in behalf of the poor of the province, and on the accession of Louis XVI he first became minister of marine, and afterwards, comptroller-general of France, the latter office being practically that of prime minister. In this capacity he strove to regenerate the financial, social and political system of France, always with a view to the amelioration of the condition of the people; but he became extremely unpopular through some of his attempts, notably that of making the clergy and nobility contribute to the support of the government in the same proportion as did the common people. After 20 months he retired from office. Against Turgot's talent for statesmanship is charged his want of address and an impolitic frankness. On his retirement he took up literature, physics and mathematics, writing a valuable *Mémoire* on the American war and a work entitled *Usury*.

Turin, Tu' rin, a charming Italian city, situated in the northeastern part, on the Dora Riparia and the Po. The modern city is upon the foundations of the ancient Roman city and retains the rigid regularity of streets and squares which

the original city possessed. Turin lies 780 ft. above sea level and in the shadow of the Alps; thus it is unexcelled in location. The city is especially noted for its remarkable monuments, statues and memorials. Among these may be mentioned the Mole Antonelliana, the highest brick building of Europe, now used as a museum; the Piazza Vittorio Emmanuele II; the Mont Cenis Tunnel monument, commemorating the engineers of the famous tunnel; the Crimean monument; the monuments to Cavour, Duke Ferdinand, Garibaldi and many others, all of great artistic worth. The University of Turin, founded in 1405, gives especial attention to science but is excellent in all literary and professional departments. The present buildings were constructed in 1713 but have been added to until they are modern in appointments. Other important buildings are the Cathedral of St. John the Baptist, the Palazzo Madama and the royal palace. The industries of Turin include metallurgy, weaving, tanning and the manufacture of chocolate, motor cars and chemicals. Because of the convenient sources of power from the Alpine torrents, electricity is put to innumerable uses. Turin has always been a city of military importance, owing to its nearness to the frontier. Population, 427,733.

Turkestan, Toor" ke stahn', a region in central Asia, between the Caspian Sea, the Russian steppes and the Mongolian Desert. The political divisions are Western, or Russian, Turkestan and Eastern, or Chinese, Turkestan. Russian Turkestan includes Samarkand, Ferghana, Semiryetchensk and Syr-Darya, an area of about 411,500 sq. m., having a population of approximately 4,900,000. The territory is generally flat and sandy, and embraces the deserts of Kizil-kum, Karakum and Mujun-kum, the mountains belonging to the systems Hissar, Alai and Tian Shan, and the large Lake Balkash. The rivers are numerous, but the climate is continental; where irrigation is resorted to, the yield of wheat, millet, oats, rice and various kinds of fruit is large. The manufactures are still undeveloped

and the exports are principally raw products sent to Russia. The inhabitants are mainly Mohammedans, and their largest cities are Tashkent (the capital), Samarkand, Namangan and Khokand.

Chinese Turkestan is an isolated and dreary dependency, made up of monotonous plateaus and the extensive Desert of Gobi. The dry climate restricts the inhabited areas to the oases and the territory along the mountain ranges. Stock raising, hunting, commerce and agriculture are the chief occupations. The mineral resources are as yet unexploited except in a primitive way; the yield is saltpeter, asbestos and sulphur. Urumchi is the seat of the administration.

Turkey. One of the most unexpected results of the World War was the amazing recovery of "the sick man of Europe." For nearly three centuries the Ottoman Empire, once the chief military power of Europe, had been on the decline. Corruption at home and hostility abroad had reduced the empire to a fraction of its former size by 1914 and it was fully expected that the Allied victory would sound the doom of Turkey as a world power. But in Anatolia (Asia Minor) there sprang up a virile nationalism, fostered by the Young Turks, that has resulted in a new Turkey, with a republican government and a far-reaching program of westernization. The young Turkish republic is today enjoying better political and economic health than many of the powers that a decade ago were smugly scheming to obtain choice portions of the dying Ottoman Empire.

Early in the 13th century a small band of nomadic adventurers from Central Asia drifted into the Anatolian peninsula in search of fertile and clement lands. They embraced the Mohammedan religion and were given territory in northwestern Asia Minor by the Seljuk sultan. One of their leaders, Osman (Othman), laid the foundations of the independent power of his tribe, which took his name, becoming

the Osmanli or Ottoman Turks. His son, Orkhan (1326-59), continued the conquest of Asia Minor, made Brusa his capital, and gained a foothold in Europe by taking Gallipoli in 1354. It was Orkhan who founded the famous Janissaries, professional troops, recruited by levying the Christian boys of subject peoples and rearing them as Moslem soldiers. The Turks soon overran the Balkan peninsula. Great Christian armies were routed at Kossovo (1389) and Nikopolis (1396). In 1453 Mohammed II took the city of Constantinople and the Byzantine Empire was at an end. Under Solymán the Magnificent (1494-1566) the Osmanli Empire reached the height of its glory. On the field of Mohacs (1529) Solymán won half of Hungary and shortly his armies were beating at the very gates of Vienna—but in vain. Solymán was the first sultan to proclaim himself caliph (spiritual head of Islam). This consecrated the Osmanli military power to a religious end and introduced the crusading spirit that made so much bad blood between the Turk and his Christian subjects in after years. In 1683 the Turks again besieged Vienna, but were repulsed by the Polish king, John Sobieska, who came to the relief of the city. The Osmanli Empire had at that time reached its greatest territorial extent. It stretched from the Carpathians to Yemen and from Persia to Morocco; the Black Sea was a Turkish lake and Turkish galleys patrolled the Mediterranean.

But the sun of Ottoman glory had already passed its zenith. In the battle of Lepanto, in 1571, the galleys of the Holy League had inflicted a crushing defeat on the Turkish fleet that was ominous of future events. Within the empire despotism, corruption, and incompetence were slowly and surely undermining its power. The Hapsburgs wrested Hungary from Turkey in the 18th century and Russia drove her from the north shores of the Black Sea. Greece won her independence in 1829 and in 1830 the Serbians secured autonomy. In the Crimean War, 1854-

56, France and England saved Turkey from the depredations of Russia, but the Russo-Turkish War of 1877-78 would probably have ended the Ottoman power in Europe had not the other nations, jealous of Russia's growing prestige in the Balkans, revised the Treaty of San Stefano at Berlin in 1878. This congress left Turkey with Macedonia and a nominal possession of some portions of her former European territories, while at the same time Montenegro, Serbia, and Roumania were given complete independence. In spite of his promises to reform it, the corruption of the Turkish government under Abdul Hamid II (1876-1909) became a byword in Europe. The nation was on the verge of bankruptcy; "palace government" with all its attendant evils flourished; attempts at progress were thwarted at every turn; and the Armenian massacres were an outrage against all civilization.

Just when things were at their lowest ebb, a group of men, known as the Young Turks, took things into their own hands and with the aid of the army effected the revolution of 1908 by restoring the constitution of 1876. This constitution had been withdrawn by Abdul Hamid II almost as soon as it was granted. Following an unsuccessful counter-revolution, the sultan was deposed and his brother, Mohammed V, succeeded to the throne in 1909. The militant nationalism of the "Young Turk in a hurry" naturally antagonized those groups who were opposed to "turkification." Moreover there were foes abroad who were not slow to take advantage of this internal dissension. Austria calmly annexed Bosnia and Herzegovina and Bulgaria boldly proclaimed her independence. Tripoli was lost to Italy in the war of 1911-12 and the first Balkan war in 1912-13 deprived Turkey of all her European holdings except Constantinople, Adrianople, and a little adjacent territory. Then the World War burst upon Europe.

For some years prior to 1914 Germany had been the chief foreign influence in the Ottoman Empire. She held most of the concessions, including that of the

Bagdad railway; her officers drilled the new Turkish army; and her bankers supplied much needed funds. It was clear, therefore, that Turkey's course in the war lay with the Central Powers and against her arch-enemy, Russia. After the armistice of 1918 the Turkish people looked for a harsh peace and the loss of much territory, but when it became evident that the western diplomats were bent upon the dismemberment of Turkey with scant regard for the Turks themselves, the natural resentment of the people at this manifestly unfair treatment found expression in the nationalist movement headed by Kemal Pasha (See KEMAL PASHA). By 1920 the Kemalists had established a government in Angora that deprived the sultan of all control of Anatolia. According to the Treaty of Sèvres, which was submitted by the Allies in May, 1920, Turkey lost Arabia, Mesopotamia, Armenia, Syria, Palestine, Thrace, Smyrna, and some Aegean islands, while the Dardanelles were neutralized. Egypt had already become a British protectorate. Under protest the Constantinople government finally signed the treaty, but the Nationalists attacked it vigorously. Their army recovered part of Cilicia and some trans-Caucasus territory and in 1922 drove the Greeks from Smyrna, which the treaty had put under their control. In November of that year Mohammed VI, who had succeeded to the throne on the death of Mohammed V in 1918, was deposed and shortly thereafter the Angora government requested the Allies to evacuate Constantinople, which they had held since 1918. The National Assembly elected Abdul Medjid caliph in place of the deposed sultan, but deprived him of all but spiritual power. During the following months the Angora government took on an increasingly republican aspect until, in October, 1923, Turkey was declared a republic and Kemal Pasha was elected its first president. Early in 1924 the last vestiges of the old empire disappeared when the caliphate was abolished. Meanwhile the Kemalists had gained the recognition of the foreign powers and a conference held at Lausanne to adjust the Turkish question resulted in a treaty (signed July 24, 1923) between the Nationalist government and the Allies restoring Smyrna and eastern Thrace to Turkey, abolishing capitulations (special privileges to foreigners), and providing for the free navigation of the straits. In October, 1923, the occupation of Constantinople by the Allies formally came to an end. Turkey is at last free to work out her own salvation without foreign interference.

The government of the new republic consists

of a national assembly elected for four years by universal male suffrage. The president is elected by the assembly from its own members, as are the members of the cabinet who, with the president, are jointly responsible to the assembly.

With the birth of this new nationalism a program of westernization was undertaken. Education was made free and compulsory and the establishment of a national school system was begun. Freedom of religious belief was permitted. The veil and the fez were cast aside and polygamy and the harem became things of the past. In 1928 the Latin alphabet was substituted for the Arabic, which had been adopted with the acceptance of the Mohammedan religion.

Turkey is now a poor country, but it has enormous possibilities. Agriculture and stock raising are the chief occupations of the people. The soil is very fertile, but only a small portion of the tillable land is under cultivation, owing to the primitive methods still in use. The chief crops are cereals, tobacco of an excellent quality, nuts, olives, grapes, fruits, opium, gums and madder. Cotton, introduced in 1905, is now a valuable crop and recently a Turkish syndicate has begun the growing of sugar beets. Many sheep and goats are raised, especially in the eastern sections. In some districts mulberry trees are grown as a part of the silk-raising industry, but there is urgent need of a comprehensive reforestation project. Although Anatolia is rich in minerals, they have been little worked. Silver, copper, coal, zinc, lead, iron, gold, chrome, meerschaum, and salt are found in paying quantities.

Aside from a few factories in Constantinople there is almost no manufacturing. The articles produced elsewhere are chiefly the products of hand labor. Rugs, olive oil, soap and artistic handwrought brass and copper utensils are the most noteworthy. The imports are chiefly manufactured goods, while the exports are grapes, raw silk, wool, tobacco, cotton, carpets, hides, and grain. There are few railroads in Anatolia and the roads are wretched.

In 1914 the Turkish Empire had an area of 710,224 square miles and a population of more than 21,000,000. Today it consists chiefly of Anatolia and a small piece of territory about Constantinople. Its population, estimated at 8,000,000, is a mixture of many nationalities. Even the Anatolians, who have preserved more Turkish traits than the people elsewhere in the old empire, are far from being racially pure. The Ottoman Turks originally belonged to the branch of the Mongolian race from which came the Magyars and the Tatars, but by centuries of intermarriage with subject peoples, slaves, and the Janissaries, they have become more Caucasian than Mongolian.

Turkey, a bird of the Turkey Family. The wild turkey is about four feet long; the head and neck are bare; the chest has

a tuft of bristly feathers, and a fleshy, red wattle hangs from the upper part of the bill. It is more brightly colored than the domestic turkey. The nest is placed on the ground and from 8 to 13 eggs are laid. The wild turkey once ranged through North America as far north as Ontario, and also in Central America. It has been driven from most of its early haunts and is now found in only a few localities. The domestic turkey is said to be the descendant of the wild turkey of Mexico.

Turkey Buzzard. See BUZZARD.

Turkey Vulture. See BUZZARD.

Turmeric, *Tur' mer ik*, a dye produced from the inner bark of the turmeric tree, which grows in southeastern Australia. Turmeric is a yellow, resinous substance, and is employed principally in dyeing silk and wool and for coloring salves, ointments, etc. However, its chief use in India is as a constituent of curry powders, giving them their bright yellow color. When white paper is soaked in a tincture of turmeric, it changes to a reddish-brown color, drying out to a violet when an alkali is added to it; therefore, test papers for alkalies are prepared from it and are known generally as curcuma papers or turmeric papers. See DYEING.

Tur'ner, Joseph Mallord William (1775-1851), an eminent English landscape painter, born in London, the son of a barber. At the age of 14 he entered the Royal Academy for study; and after many successful exhibits he became a member of that body in 1802. His early work was done in water colors, but his later paintings were in oil. His methods were radical and revolutionary and his daring use of color led to severe attacks from critics. He was vigorously defended by Ruskin in his *Modern Painters*, in which he gives a complete analysis of Turner's work. Among his most successful productions are *Crossing the Brook*, *Dutch Boats in a Gale*, *Falls of Clyde* and *Sun Rising Through Vapor*.

Tur'nip, a hardy biennial plant of the Mustard Family, raised for its sweet fleshy root. In the wild state this root is hard and woody, but cultivation has

transformed it into a nutritious vegetable valued for the table or for food for stock. Since the turnip is a biennial, it produces only the thick root and crown of fleshy, succulent leaves the first season. In southern Asia, where it is native, it may be left in the ground over winter, and in the second season it will send up a flower stalk which produces many flowers and, later, pods of small dark seeds. In the temperate climates, into which the turnip has been introduced as a field vegetable, the roots must be stored through the winter if seed is desired. Many varieties of turnips are known; the white, globular roots are the most desired for the table. A large, yellow, firm-fleshed species, known as the Swede, or rutabaga, is extensively raised for stock. The ordinary turnip contains 90 per cent of water; the rutabaga has about 86 per cent.

Turn'stone", a bird of the Snipe and Plover Family. It is a trifle larger than the robin; the upper parts are mottled with black, white and reddish-brown, and the under parts are white. Black lines extend from the eye and bill and join a black spot on the neck and the sides of the breast. The feet are red. The nest is a depression in the ground, lined with leaves or grass. Four eggs spotted with dark brown are laid. The name is given to these birds on account of their habit of turning over pebbles, shells and other beach objects in search of food. They live in North and South America, breeding in the Arctic regions and wintering from California and South Carolina as far south as Brazil and Chili.

Tur'pentine, the distilled, resinous sap of several species of pine trees which grow abundantly in southern United States, Russia and France. The early method of obtaining it was by the box system, a process extremely destructive to the trees. By it the trees were hacked at close intervals, and the exuding gum was collected in a pocket or box, cut into the trunk of the tree at its base. This process meant the certain death of the tree, and laid it open to the entrance

of disease or particularly to danger from fire. Owing to the labors of the United States Forestry Department a system similar to that made use of in collecting sap from the sugar maple is now being employed in the United States. By this process, called the cup method, a spigot is introduced into the tree, and a bucket attached for collecting the gum. To prepare turpentine for the market, the gum is distilled; that which passes over is called oil of turpentine. The residue is the source of resin. Turpentine is used in medicine, in the arts in the preparation of varnishes, and as a naval supply. See RESIN; TAR.

Turquoise, *Tur koiz'*, a precious stone, composed chiefly of hydrated aluminum and copper phosphate. It is opaque, with a waxy luster, and of varying shades of blue and green. It occurs in narrow veins in igneous or volcanic rocks. The finest turquoises have been found in Persia and have become the property of the Crown, only the inferior gems being exported from that country. Fine specimens also are mined in New Mexico and adjacent sections of the United States in mines opened by the ancient Mexicans.

Tur'tle, an aquatic reptile of the Chelonid Family, having, like all members of the family, a hard, bony shell above called the carapace, and a smaller one below called the plastron. From between these shells, which are often beautifully marked, protrude the flattened ugly head and huge, paddlelike limbs. The jaws of the turtle are horny and rather formidable, especially those of the huge snapping turtle of the inland lakes. The eggs of the turtle are deposited in holes upon sandy beaches, where they are covered and left to hatch by means of sun and moisture. The young turtles, when hatched, dig their way out and take at once to the water. Their food is seaweed and Mollusks. The flesh and eggs of the green leatherback and snapping turtles are excellent food. The terrapin is a favorite food turtle found along the Atlantic coast of the United States. See TORTOISE; TERRAPIN.

Turtle Dove. See MOURNING DOVE.

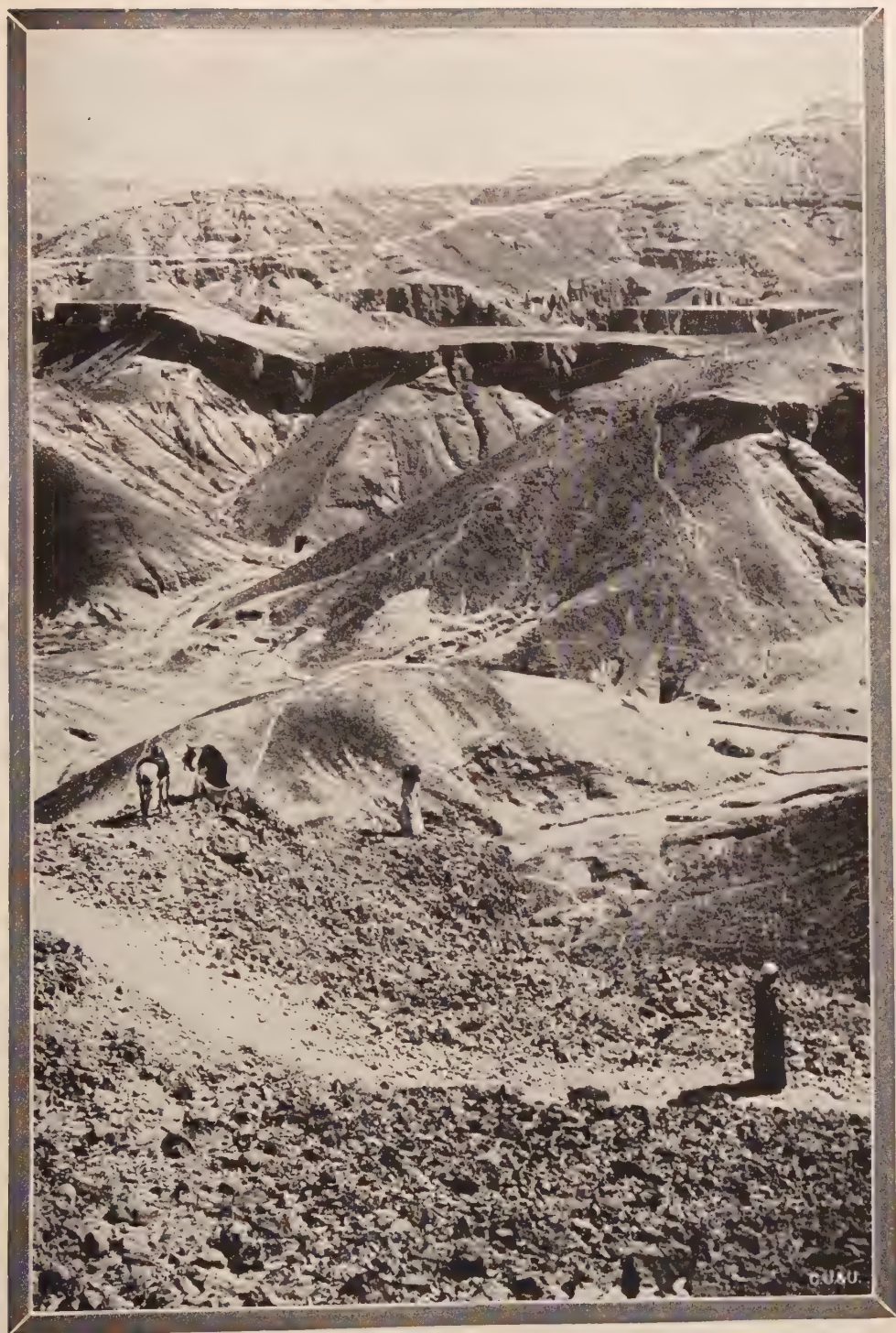
Tuscaloosa, *Tus' ka loo' sa, Ala.,* a city and the county seat of Tuscaloosa Co., 56 m. s.w. of Birmingham, on the Black Warrior River and on the Mobile & Ohio, the Alabama Great Southern and other railroads. Improvements made in the river channel above the city in the interests of navigation have greatly advanced the commercial activities of the city. In the vicinity coal is mined, and at Holton, a suburb of Tuscaloosa, there are iron and coke furnaces and other plants connected with the mining industry. Among other establishments are cotton gins, cotton compresses, machine shops, a pipe foundry, flour mills and creameries. Tuscaloosa is the seat of the University of Alabama, opened in 1831, and contains a number of other important educational institutions, including the Tuscaloosa Female College (Methodist Episcopal, South); the Stillman Institute (Presbyterian); a negro theological school; and Alabama Central Female College (Baptist). Here also is the Alabama State Insane Hospital. Among the other noteworthy features of the city are the old state capitol, a fine Federal Building and river bridges. The first white settlement on the site of Tuscaloosa was made about 1812; it was chartered in 1819, and from 1826 to 1846 was the state capital. The name is said to mean black warrior and to have been given in honor of an Indian chief. Pop., 1920, 11,996; est., 1925, 13,083.

Tuscany, *Tus' ka ny,* a district of the Kingdom of Italy, comprising the provinces of Grosseto, Lucca, Pisa, Livorno, Arezzo, Florence, Siena and Massae Carrara. It embraces the territory once occupied by Etruria, the Etrurians, or Etruscans, being the first inhabitants known to history. The Romans conquered them, and the land was later occupied by the Ostrogoths and the Lombards. Charles the Great conquered the Lombards and established his residence at Lucca. During the Middle Ages Tuscany became prominent in the revival of letters, and the Tuscan dialect was gradually accepted as the literary

language of Italy. Among prominent names are those of Dante, Boccaccio, Petrarch and Giotto. Between 1745 and 1859 the state was in the possession of the Emperor of Germany. In 1860 Tuscany voted to unite with Italy. See ITALY.

Tus''caro'ra, a tribe of North American Indians formerly living along the Tar and Neuse rivers in North Carolina. They massacred the whites and were forced to flee. They went to New York and became one of the six nations of the Iroquois League. About 700 live in Canada and New York. See FIVE NATIONS.

Tuske'gee Normal and Industrial Institute, at Tuskegee, Ala. (1881). Established as a state normal school for negroes and aided by the state for some years, this school was incorporated under its present title in 1893. Booker T. Washington, who was appointed to establish it, was its first principal and managed it with great ability until his death in 1915. It has received large gifts from Congress, Andrew Carnegie, the John F. Slater Fund, the General Education Board, Mrs. Russell Sage, and other sources. Today it offers all the opportunities afforded by any normal and industrial school in the world; it controls large properties and has an annual income of over \$400,000, a sum equal to the total assets of many a so-called college of good repute in the locality that it aims to serve. The institute is coeducational and tuition is free. Opportunity to pay a portion of the necessary expenses is afforded to all students. Classroom instruction, supplemented by extended and careful training, is given in those trades and industries for which skilled artisans are in demand, some 40 in all. This training makes the graduates of Tuskegee financially independent almost from the beginning. But they are trained also for effective work as teachers, special attention being given to the development of such character and methods of work as shall make them wise leaders in the uplift of their race. Tuskegee enrolls about 2500 students and more than 600 in the summer school.



Valley of the Tombs of the Kings near Luxor, Egypt, showing the scene of many years of patient excavation work.



(Top)—Outside the tomb of Tut-Ankh-Amen. (Left Center)—Lord Carnarvon, his daughter, and Mr. Howard Carter. (Right Center)—Bringing out chair 3,400 years old. (Bottom)—The meal that was entombed with King Tut.

It has enjoyed the support of the white people of the South. See HAMPTON NORMAL and AGRICULTURAL INSTITUTE; WASHINGTON, BOOKER TALIAFERRO.

Tus'sock Moth, a common family of moths whose caterpillars do great damage to the foliage of fruit and shade trees. The white, foamy patches of eggs may be seen in the crevices of tree trunks or in angles of the branches early in the spring or in the very late autumn. From these hatch the hairy, well-marked caterpillars. The general color of their bodies is bright yellow or tan color, but the back has a noticeable black line; the head is coral-red. Proceeding from the head are two long and black tufts of hair, and a single similar tuft extends from the posterior extremity. Near the head in a single row along the back are four shorter brushes of cream-colored hair, which sufficiently distinguish this caterpillar from all others. In this stage the tussock moth feeds with great voracity upon the leaves of all trees, seeking a new feeding ground as fast as the old is defoliated. In the adult stage the male and female differ widely; the female has only rudiments of wings, and with her plump, gray body and long legs she resembles a spider rather than a moth. The male has well-developed wings; in color it is ashy-gray, with darker markings. Its power of flight is not great, and as the female deposits the eggs in the cocoon from which she herself emerged, migration takes place almost entirely during the caterpillar stage.

Tut-Ankh-Amen, Toot-Onk Amen, an Egyptian king, one of the pharaohs of the eighteenth dynasty, whose tomb was discovered late in 1922 by an expedition financed by Lord Carnarvon, of England, and directly by Mr. Howard Carter, an American. The discovery excited world-wide attention because it was the first practically undisturbed tomb of an Egyptian king that had been found. A rich treasure of royal garments, furniture, works of art and even chariots was found in the tomb, these having been buried with the deceased in accordance

with the Egyptian religious custom of providing the dead with the comforts and conveniences used in life. The door of the tomb was opened February 15, 1923, in the presence of a distinguished gathering of scientists, writers and royal personages including the King and Queen of Belgium, and preparations were made by Egyptologists to begin an exhaustive and systematic study of the tomb and its contents.

Twain, Mark. See CLEMENS, SAMUEL LANGHORNE.

Tweed, a river of Scotland, rising 15 m. s.w. of Edinburgh and flowing east and northeast until it empties into the North Sea at Berwick. Its total length is 97 m., of which 18 m. form the boundary between England and Scotland. This region through which it flows represents a part of the historic "Border" territory of Great Britain.

Tweed, William Marcy (1823-1878), an American politician, born in New York. After holding several public offices he became "boss" of Tammany Hall, and as leader of a group of influential but unscrupulous politicians, called the "Tweed Ring," obtained control of the financial affairs of the city and robbed it of millions of dollars. He was convicted, and died in jail.

Twelve Tables, Laws of the. See ROME, ANCIENT, subhead *The Republic*.

Tyler, John (1790-1862), tenth president of the United States, born at Greenway, Va., the son of Judge John Tyler, a former governor of Virginia. He graduated from William and Mary College in 1807, and two years later was admitted to the bar. In 1811 he became a member of the State Legislature, where he supported the War of 1812 and served until 1816, when he entered Congress. In 1825 he was elected governor of Virginia and was reelected the following year. Becoming a member of the United States Senate in 1826, he pursued an independent course, opposed the tariff measures of 1828 and 1832, condemned Jackson's nullification proclamation, although not himself in favor of nullifica-

tion, was the only senator to vote against the "Force Bill" of 1833, and supported Clay's resolution of censure against the President for removing the deposits from the United States Bank. In 1836 he resigned his seat rather than vote to expunge this resolution of censure from the records, as the Virginia Legislature had instructed him to do.

Tyler became one of the leaders in the new Whig Party, and in 1840 was elected vice-president of the United States on the ticket with General Harrison. Upon the latter's death, one month after his inauguration, Tyler succeeded to the presidency. During the first year of office he broke with the Whigs over the project to reestablish the national bank, and vetoed two bills for that purpose. When the bill to revise the tariff met a similar fate in 1841, all the members of the cabinet resigned except Daniel Webster, who remained to complete the Webster-Ashburton Treaty. In 1842 he also resigned and was succeeded by John C. Calhoun. Aside from this treaty the most important measure of Tyler's administration was the annexation of Texas in 1845.

At the close of his term of office Tyler retired to his estate in Virginia, where he remained until 1861. In that year he was called upon to preside at the Peace Convention at Washington, the purpose of which was to effect a compromise between the North and the South. After the failure of this effort, he joined the Confederate cause, voted for secession in the Virginia convention and served in the Confederate Congress until his death.

Tyler, Moses Coit (1835-1900), an American educator and historian, born in Griswold, Conn., and educated at Yale and at Andover Theological School. He was pastor of Congregational churches at Owego and Poughkeepsie, N. Y., and from 1867 to 1881 was professor of English at the University of Michigan, from then until his death filling the chair of American history at Cornell. His writings include *Literary History of the American Revolution*, *History of American Literature*, *Manual*

of English Literature and Glimpses of England.

Tyler, Tex., an agricultural center and the county seat of Smith County, 105 miles southeast of Dallas, on the Missouri Pacific and the St. Louis Southwestern railroads. It has a municipal airport. Tyler is situated in a prosperous agricultural district producing large quantities of fruit and vegetables. The city has railroad shops and general offices, several wholesale houses, and manufactories of various products, including work clothing, women's clothing, cottonseed oil and fertilizer, syrup and candy, brick and brick products, peanut butter, and powdered milk. There are also nurseries and a plant for packing and shipping peanuts and pecans. Chief among the educational institutions are the Tyler Commercial College, one of the largest commercial colleges in the United States, and two institutions for negroes—Texas College and Butler College. Tyler was settled about 1844 and was incorporated in 1850. Population, 13,200.

Tyler, Wat (?-1381), an English social reformer. Nothing is known of his antecedents, but in 1381 he headed the revolt of the peasants against vested interests which is known as Tyler's Rebellion. Starting in Kent, he collected an army of peasantry, which, after capturing the Castle of Dartford and securing the allegiance of Canterbury, marched into London on June 13. The London populace siding with them, the insurgents forced King Richard II to grant their demands, which included the abolition of serfdom, of poll taxes and of the Statutes of Labor, by which wages had been fixed in the interest of landlords and of master craftsmen. Most of the commons then returned to their homes, but a part remained under Tyler, who demanded further economic concessions. At a meeting, the King granted these demands, but Tyler, who had been separated from his army, was assassinated. The insurgents were lured out of London and later dispersed. Aft-

er the death of Tyler and the retirement of his army, the liberties granted the people were revoked and the remnants of the rebellion were stamped out with great severity.

Tyndale, Tin' dal, William (about 1495-1536), an English translator of the Bible, born in Wales and educated at Oxford and Cambridge. After leaving the university he became a chaplain, and because of his sermons, was censured for boldness and indiscretion by the chancellor of the diocese. This experience determined Tyndale to translate the New Testament, but, unable to obtain aid in London, he left for the Continent in 1524. Having visited Luther at Wittenberg, he established himself for a time at Cologne, whence he was expelled and went to Worms. There his octavo edition of the New Testament was printed in 1525, being immediately carried to England. Five years later his translation of the Pentateuch appeared at Marburg. He separated himself from other English reformers by opposing the divorce of Henry VIII, with the result that, in 1535, he was arrested at the instance of the King, in Antwerp, and after 16 months' imprisonment was strangled and burned as a heretic. In addition to his translations, Tyndale wrote *The Obedience of a Christian Man*.

Tyndall, Tin' dal, John (1820-1893), an English scientist, born at Leighlin Bridge, Carlow, Ireland; he died in Surrey, England. At the age of 19 years he joined the Irish survey company, and was engaged for a time in railroad engineering. In 1848 he went to the University of Marburg, where he spent two years and received his doctor's degree. He then went to Berlin, where he made the acquaintance of Magnus and Wiedemann. Returning to London in 1852, he was elected fellow of the Royal Society, and in 1853 he was appointed to the chair of natural philosophy in the Royal Institute, succeeding Faraday. At the death of Faraday he became superintendent of that institution and continued in office until 1887. In 1872 he published

a volume of great value on radiant heat. He made yearly trips to the Alps to study glacial phenomena, and in 1856 the results of these studies were reported to the Royal Society. In 1872 he lectured with great acceptance in the United States. Tyndall gained a wide reputation by his writings and lectures, which, while noted for their high literary standard and scientific accuracy, were couched in popular language. Among his published works are *Fragments of Science for Unscientific People*, *Glaciers of the Alps* and *Heat as a Mode of Motion*.

Type, a piece of wood, metal or other material, on one end of which is engraved or cast a letter, figure or design for the purpose of printing. The first types were blocks of wood containing script letters similar to those in copy-books, or having characters as used by the Chinese. In the early days of printing, each printer made his own type. Type founding or casting is now quite an extensive industry, and while a few of the larger types are still made of wood, all others are made of type metal, which consists of an alloy of lead and antimony, with sometimes a little tin or copper.

A complete assortment of type, called a font, contains about 225 characters, which include for English printing all the large and small capitals, small letters and italics, punctuation marks and figures in the variety required. In ordinary use there are 13 sizes of types, which are designated by special names or by the number of points they measure, one point being 1/72 of an inch; those in most common use are as follows:

Nonpareil	6-point
Minion	7-point
Brevier	8-point
Bourgeois	9-point
Long Primer	10-point
Small Pica	11-point
Pica	12-point
English	14-point

The smaller sizes are used in printing pocket editions of the Bible, in newspapers and sometimes in tabular work.

Eight-, nine-, ten- and eleven-point sizes are used in printing books. This book is printed from ten-point type. See **ELECTROPLATING**; **PRINTING**.

Type'set'ting Machine, a machine for setting type. There were many attempts to construct a machine which would take the place of the compositor before a successful device was invented. All typesetting machines are operated on the principle of the keyboard, which resembles very closely the keyboard of a typewriter, but usually contains more characters. When the operator presses the key, the required type or a mold for casting that type is placed in its position in the line. The first successful machines used type similar to that used in hand composition. The type for each character was placed in a compartment, which had a channel just large enough for one type to pass through lengthwise, and when the key was pressed, this dropped into its position in the line.

THE LINOTYPE. The machine described above did not distribute the type, and a separate machine was necessary for this purpose. The two machines were combined in the linotype invented by Ottmar Mergenthaler. Instead of setting the type, this machine sets matrices or molds for casting the type. As the operator fingers his keys, the matrices are arranged in line. When the line is completed, by touching a lever the words are properly spaced or "justified," when the machine moves the matrices under a tube which fills them with molten type metal. The type is thus cast into a solid line, which is placed by the machine in its proper place in the galley. An arm then seizes the matrices and returns them to the case, where each is distributed to its proper compartment ready for use again. The linotype is the most rapid typesetting machine and the one in general use in newspaper offices. Many improvements have been added to the original machine, so that the linotype is quite extensively used for book and magazine work.

THE MONOTYPE. The monotype casts the type separately and places the char-

acters in line one by one, as in hand composition. The monotype consists of two parts, the keyboard and the casting machine, which are entirely separate. The keyboard operator prepares the work for the casting machine by perforating a paper ribbon, each key perforating the ribbon at such a point as to cause the character which the key represents to be cast in the machine. The perforated ribbon is run through the casting machine and operates on a principle similar to that of perforated music in the pianola, each perforation causing the matrix casting the character to be brought under the tube which fills it with molten type metal. The monotype casting machine is a complicated and delicate mechanism and represents the highest inventive skill. To one unacquainted with its construction, it seems to possess something akin to human intelligence. The monotype is used for the highest grade of book and magazine work, but since it requires two operators, composition by it is more expensive than by the linotype.

Typewriter, *Tipe' ri' ter*, a machine for writing on paper with type. The modern typewriter represents the achievements of many years of trial and invention. So far as known, the first attempt to make a machine for writing with type was in 1714, when a patent was granted in England for such a device. Between that date and 1850 numerous attempts to perfect a typewriter were made in European countries and the United States, but it was not until 1874 that a successful machine was placed on the market. The construction and perfection of this machine were due to the mechanical genius of Charles L. Sholes, Samuel W. Soule and Carlos Glidden, who were assisted financially by James Densmore. Contract for the manufacture of this machine was made with E. Remington & Son, gun manufacturers of Ilion, N. Y. The mechanics in the factory made several important changes in the original machine before placing it on the market. From this beginning, the typewriter industry in the United States has continued to grow until this country practically

supplies the world with typewriters, and the annual output exceeds \$7,000,000 in value.

Two successful types of machines have been placed upon the market, known respectively as the basket machine and the cylinder machine. As originally made, the basket machine had the characters attached to the ends of steel bars, which were attached by horizontal pivots to a circular frame, forming an arrangement resembling a basket. The short arm of each bar was attached by a wire to the lever, operated by pressing the key. The bars were of such lengths that all characters struck against a rubber cylinder, called the platin, at the same point, the writing being done by striking the characters against an inked ribbon beneath the paper.

Many patterns of this type of machine have been placed upon the market, and until recently they were in general use. In the old type of basket machine, the writing was invisible. This defect has been remedied by placing the type bars in a horizontal position in a semicircular frame, and "visible writers" have practically replaced the old-style machines. Many attachments for increasing the efficiency and extending the scope of work of the typewriter have been made, but none has changed the principle upon which the original machine was constructed. Cylinder machines have the type so arranged on a cylinder that when a key is pressed the corresponding character is brought in contact with the paper. Machines of this pattern are but little used.

Typhoid, *Ti' foid*, Fever, an infectious and wasting disease, marked by long-continued fever. It is caused by a bacillus which enters the body in impure water or infected food. The disease does not develop until after the germ has been about three weeks in the body. It begins with disorder of the bowels, languor, chills and headache, followed by fever, delirium and a surface rash. In severe cases the irritation of the intestines may result in ulceration. When the ulcers perforate the intestinal walls,

death ensues. The malady is one requiring the utmost care and skill at each stage of its development. Medicines play a small part in the treatment, nursing and nutrition very important parts, and care should be given to the patient's diet.

Typhoid is not communicated by contact or by breathing the same air with the patient. The germ is dangerous only when taken into the stomach and intestines, and it does not then invariably result in disease. As in the case of all other bacterial invasion, it usually takes possession where the system is in a depleted condition. The bacilli are present in the excrement of the patient, and care should be taken to destroy the germs with chemicals or by burning the material to prevent their passage into sewage, from which they may find their way into another organism and again be the cause of disease. Clothing and bedding used by the patient also should be sterilized. Milk and flies are common carriers of the typhoid germ.

Typhoon, *Ti' foon'*, a local name given to the cyclonic storms of the China Sea and the region of the East Indies. These disturbances are never more than a few hundred miles in diameter, but they have long courses and are often of great violence. Their direction is first northwest, then northeast. One typhoon was traced from near Manila across the Pacific Ocean and North America, then across the Atlantic and western Europe to the region of the Baltic Sea, where it finally vanished, having traveled 14,000 m. and lasted 35 days. Disturbances similar to these storms in the neighborhood of the West Indies are called hurricanes.

Typhus, *Ti' fus*, Fever, also known as hospital fever, jail fever and spotted fever, a highly contagious fever, usually caused by destitution, overcrowding and bad ventilation, and prevailing as an epidemic. The disease comes on with a headache, high fever and rheumatic pains. About the fifth day an irregular rash of red spots, which gradually become darker, appears on the skin. The patient becomes exceedingly weak and is usually delirious. The crisis is reached

about the 14th day, after which recovery is rapid. The disease is highly contagious and all cases should be isolated. The patient should be kept in a well-ventilated room and nourished with wholesome, easily digested food. Typhus fever is now seldom found except in the slums of great cities and among half-civilized nations.

Ty'rant Fly'catch'er. See KINGBIRD.

Tyre, Tire, an ancient city of Phœnicia situated on the eastern shore of the Mediterranean, founded at an unknown and remote date. It was a double city, one portion being on the mainland, the other on a small island, the two being separated by a strait about half a mile wide. From 1200 to 850 B. C. it was the chief commercial city of the world, being especially famous for the dye, Tyrian purple. In the time of David and Solomon, Hiram, King of Tyre, was on friendly terms with the Israelitish monarchs, furnishing David with timber and workmen for his palace, and Solomon materials for the Temple. In 332 B. C.

Tyre was besieged and captured by Alexander the Great, and the proud city never recovered from this downfall. Modern Tyre, or Sur, is an unimportant village.

Tyrol, Tir' ol, a province of Austria-Hungary, bounded by Bavaria, Salzburg, Carinthia, Italy, Switzerland and Vorarlberg. In Alpine scenery it rivals the beauty and grandeur of Switzerland, but it possesses no lakes, except the Lago di Garda in the southern part. Meadows and forests cover its area, and cultivation of the soil is little resorted to. Tyrol formed a part of ancient Rhætia and was conquered by the Romans in 15 B. C. Later it came into the possession of Germany, and since 1363 it has been held by Austria, except during the brief transference of it to Bavaria by Napoleon. Population, about 852,000.

Tyrrhenian, Ti re' ni an, Sea, a part of the Mediterranean Sea, enclosed by the Italian Peninsula on the east, Sicily on the south and the islands of Corsica and Sardinia on the west. The sea has the name given it by the ancients.

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UBANGI, *Oo bahng' ge*, a river of central Africa. It is known as the Makua and the Welle in its upper course; as the Dua and the Koyu in other portions; and as the Mobangi near its mouth. After a course of about 1500 m. it joins the Congo River.

Uganda, *Oo gahn' dah*, the western division of British East Africa lying between Egypt on the n. and German East Africa on the s., and separated from the Congo State on the w. by the lakes Albert Nyanza and Albert Edward Nyanza. Many other lakes lie within its boundaries. Almost the entire country is a lofty, fertile plateau rich in mineral wealth and in its variety of fauna and flora. Iron and copper are mined; the chief products are ivory, skins, cotton, rubber and ghee. The people are of various tribes, many of which are Christian and live in a comparatively high state of civilization.

Ukraine, a compact section of the old Russian Empire which is Ruthenian in ethnology. It borders on Poland, Galicia, and Roumania, on the west, and extends east to the valley of the Don River. Their territory as named in their proclamation independence includes Volhynia, Podolia, Kherson, Choringov, Poltava, Kharkov and Ekaterinoslav,—all provinces of old Russia, but there is a large Ruthene population in Taurida (the Crimea) Kuban and Bessarabia, this last province is claimed also by Roumania (See ROUMANIA). The prevailing population in eastern Galicia is Ruthenian, but in order to cover the period of uncertainty of the future of Ukraine, Poland is given a mandate rule over east Galicia for twenty-five years when the people are to decide whether they shall remain with Poland or join Ukraine. (See GALICIA.) The area of Ukraine as described is about 195,000 sq. m.; the

population about 45,000,000 of which over thirty million are Ruthene or Little Russians. The Ukrainians belong to the Slavic subdivision of the Aryan people. But there is considerable dialectical difference between them and the Great Russians, and they are different in physical and psychic traits. They are regarded as representing a different wave of emigration from the original homeland of the Slavic people and are nearer, ethnically, to the Southern Slavs of Serbia. They are so distinct from the Great Russians that they have been subjected to most cruel persecutions at their hand, and every effort was made to suppress their language, and to crush their sense of separate nationality.

Their territory is the very heart of the wonderfully fertile south of Russia. From their territory, by the use of primitive methods, was obtained one-third of the wheat of Russia, five-sixths of the sugar beets, nearly 175,000,000 pounds of tobacco, and there were located the largest and finest vineyards in Russia. In addition, one-third of all the cattle and one-half of the sheep, goats and pigs were from Ukraine. 69 per cent of the total iron produced in Russia and 75 per cent of the total coal production come from that same section.

Into the confused early history of Ukraine we cannot enter. Their country had to withstand shock after shock from invading people from Asia. It was a part of the Poland-Lithuanian empire of the 17th century. It passed entirely under the control of Russia before the close of the 18th century, and for two and a half centuries resisted all attempts to completely Russify it. It declared its independence of Russia January 8, 1918 and made a separate treaty of peace with the Teutonic Allies at Brest-Litovsk, February 9, 1918 (See BREST-LITOVSK).

Ulysses, *U lis' eez*, by the Greeks called Odysseus, a mythical King of Ithaca. This celebrated hero, having despaired of winning Helen of Troy, married Penelope, with whom he was most happy till the outbreak of the Trojan War. Despite his vow to protect Helen, he was loathe to leave his beloved Penelope for the battlefield. He therefore pretended a madness by plowing the seashore and there planting salt. By placing the infant Telemachus before his father's team, Palamedes proved Ulysses' sanity; for the warrior carefully directed the plow to one side.

Forced to join the expedition against Troy, Ulysses distinguished himself in wisdom and valor. But it was his trip home, after the war, that called forth all his sagacity and daring. A storm drove him to the land of the lotus-eaters, whose spell he threw off by sheer force. He met and blinded the Cyclops Polyphemus, thereby incurring the wrath of Neptune. He received from Æolus a bag of winds, over which the curiosity of his comrades nearly proved fatally disastrous. He put to naught the magic of Circe; steered successfully between Scylla and Charybdis and, after a bondage of eight years, escaped the allurements of the nymph Calypso.

On reaching home, Ulysses, aided by Telemachus, slew Penelope's 100 noble suitors, who, in his absence, had been wasting his revenues and assuming authority over his peoples. See **ÆOLUS**; **CALYPSO**; **CIRCE**; **PENELOPE**; **POLYPHEMUS**; **TROJAN WAR**.

Um''bellif'eræ, or **Parsley Family**, the name given to a group of herbs having a pungent, watery juice and a pleasing, or at least noticeable, aroma. In many cases this juice is mildly narcotic and in some it is poisonous. The stems are hollow and bear the much-divided leaves in alternating positions about them. The flowers always grow in spreading, umbrellalike clusters, botanically called umbels; and from this the family takes the name, which means umbel-bearing. The individual blossoms are generally white, blue or greenish in

color, and have five tiny points upon the green calyx cup, five small, spreading petals and five stamens. The greatest divergence in the different plants is found in the fruits, which are the means of



UMBEL

identifying species that are alike in other respects. Many of the herbs produce aromatic oils, spices or seasonings. Our commonest members of the Parsley Family are parsley, coriander, celery and caraway.

Um'ber, a mixture of oxides of manganese and iron from which paints are made. Raw umber produces a dark brown shade, and burnt umber a reddish-brown. Umber is mined in New York, Pennsylvania, Georgia and Illinois, and in many parts of Europe, chiefly in the Isle of Cyprus. Umber closely resembles ocher in appearance, being a soft, earthy pigment, but it differs from ocher in containing manganese, which ocher rarely has. See **PIGMENTS**.

Umbrel'la Bird, a bird of the Chatterer Family. This unique bird is about the size of the common crow. The male is blue-black in color, with metallic reflections on the back and crest. A long, feathered wattle hangs from the neck, and a peculiar, recurved crest ornaments the head and spreads over it like an umbrella, whence the common name of the species. The nest is a platform of twigs and branches placed in the top of a tall tree. It contains four pure white eggs. These birds are found from Central America south to Brazil, Ecuador and Bolivia.

Uncas, *Un'kas* (about 1588-about 1682), an American Indian chief, born in the Pequot settlement in Connecticut. Revolting from his tribe in 1635, he removed east of Lyme, Conn., where he founded the Mohegans. He made treaties with the colonists and in 1637 aided Mason's expedition against his former people, for which he received part of the conquered land. In 1643 he defeated Miantonomoh, the Narragansett chief, who had waged jealous war upon him, and put him to death. Uncas was always friendly with the colonists and abided by his treaties.

Uncle Re'mus. See HARRIS, JOEL CHANDLER.

Uncle Sam. The caricature known familiarly as "Uncle Sam" is a pictorial representation of the personified United States, being a figure of a tall and lank, middle-aged man, dressed in a combination of the Stars and Stripes. The name originated during the War of 1812 at Troy, N. Y. Two inspectors of provisions, Ebenezer and Samuel Wilson, were employed by an army contractor, one Elbert Anderson. The duty of Samuel Wilson, who was called "Uncle Sam" by all who knew him, consisted in placing marks of acceptance upon all approved packages. The usual marks were "E. A." and "U. S." The former were the initials of the contractor, and were placed over the second, which meant United States. A bystander noticing these initials said they might stand for Ebenezer Anderson and Uncle Sam Wilson, and thus established the connection between "Uncle Sam" and the United States. A sketch artist, whose name is unknown, made a picture interpreting the name, which was exploited and immediately became current.

Underground Railroad, the name applied to the system which was maintained before the Civil War by the Northern sympathizers to aid in the escape of fugitive slaves; this they accomplished by piloting them through the Northern States into Canada beyond the reach of the Fugitive Slave Law. The most favored routes lay through Ohio and Penn-

sylvania. The stations were private houses and the inmates were known to be pledged to the cause. The fugitives reached these stations after nightfall, were secreted during the day and at night started again on their journey. So secretly were the means of escape guarded and so swiftly were the fugitives passed along the route that it was declared there must be an underground railroad to facilitate their flight. The name caught the popular fancy and was used as long as the operations continued.

Un'derwood, Francis Henry (1825-1894), an American author, born in Enfield, Mass. After teaching school in Kentucky, and practicing law, he became connected with a publishing house in Boston, and later planned the founding of the *Atlantic Monthly*, acting as chief assistant to James Russell Lowell, the editor. From 1859 to 1870 he was clerk of the Boston Superior Court. President Cleveland made him consul at Glasgow, Scotland, in 1885, and he was appointed to the same position at Edinburgh in 1893. His writings include *Man Proposes*, *Cloud Pictures*, *Lord of Himself*, *Handbook of American Literature*, *The True Story of the Exodus* and lives of Lowell, Longfellow and Whittier.

Underwood, Oscar W. (1862-1929), an American congressman, born in Louisville, Ky., and educated at Rugby School, Louisville, and in the University of Virginia. In 1884 he began the practice of law in Birmingham, Ala., and soon became active in Democratic affairs in his state. In 1894 he was elected to the House of Representatives at Washington, serving continuously for nine congressional terms, and being reelected in 1912 to the Sixty-third Congress. He was a presidential candidate of the Democrats in 1912. In the House Mr. Underwood made a notable record as chairman of the ways and means committee and as floor leader of the Democrats, and was the author of the Underwood-Simmons Tariff Act, passed in 1913. In 1914 he was elected to the United States Senate for the terms 1915-1927. He served as American delegate to the Conference for the Limitation of Arms in 1921-22.

Un'gula'ta, one of the great orders of Mammals, made up of the families

of hoofed animals. All are herbivorous and representatives are native in all parts of the globe except Australia. They are without doubt the most useful animals, providing man with food and clothing and assisting him in his labors and his pleasures. The Ungulates are classified according to the structure of their feet and are either split-hoofed or solid-hoofed. To the first class belong the Bovine, Deer, Camel and Swine families; to the latter the Equine, Rhinoceros and Tapir families. The hoof of the Ungulata is really the tip of the modified toes, an adaptation which became necessary as the grassy plains, sandy deserts and rocky steeps must be traveled with nimbleness and speed. The flat, five-toed foot, which allows the plantigrade, or flat-footed, walk, proved to be efficacious only for dwellers in marshy lands; thus a group of more active animals was developed whose fleetness is due to this hoof formation. Changes in the structure of the teeth and the stomach have also taken place, so that the Ungulates are among the most easily identified of the Mammals. See MAMMALIA.

U'niform, a dress or costume worn by members of an organization to show that they belong to that organization. Uniforms are of three classes, military, naval and civil.

MILITARY UNIFORMS. The military uniforms of European nations were formerly modifications of the liveries worn by the servants of the royal household, but in recent years these uniforms have undergone radical modifications. Formerly uniforms were characterized by bright colors, as red, blue, yellow and green, but with the use of the modern rifle which carries a long distance, it became necessary to adopt a style of dress for field service which would render the men as inconspicuous as possible. Since khaki is the best adapted to this purpose, it has been adopted for the field uniform by the United States, Great Britain, Japan and some other nations. In the British army, gun carriages, helmets, water bottles and other paraphernalia are

all the color of the uniform. In battle this arrangement makes it difficult to distinguish the contending forces at any distance, and detachments of the same army are liable to attack each other.

Besides the field uniform, every army has more showy uniforms that may be worn on parade and special occasions. The distinguishing features of these in different countries are as follows:

Austria. Infantry, a frock of dark blue, with the color bearing patches of the regimental colors; rifle regiments, light gray; cavalry, dragoons, a single-breasted tunic of light blue; hussars, light and dark blue.

France. A tunic of dark Prussian blue and trousers of dark bluish-gray. The only decoration is the red epaulet.

Germany. The infantry wears a dark blue, single-breasted tunic with scarlet facings; the rifle regiments have dark green tunics with scarlet facings; the cavalry wears a light blue or a white tunic, with a metal or leather helmet, and the artillery have dark blue tunics with black facings.

Great Britain. The infantry wears scarlet; the rifle regiments, dark green; the artillery, blue, with scarlet facings; and the cavalry scarlet or blue.

Italy. The infantry wears a dark blue tunic and dark gray trousers; the cavalry, a dark blue tunic and light gray trousers; and the artillery have yellow facings on the tunic and dark blue trousers.

Russia. The infantry wears a dark green tunic, with a line of red piping around the collar; the trousers are green, without piping for the men, and with piping for the officers. The trousers are tucked into knee boots. The cavalry-grenadiers and dragoons wear a green tunic, with facings of red in the collar and sleeves and gray trousers.

Japan. The winter uniform is blue and the summer uniform white. Infantry, artillery and cavalry wear the same style of uniform, the marks of distinction being in the facings, which are red for the infantry, green for the cavalry and yellow for the artillery.

United States. The full-dress uniform of enlisted men consists of a dark blue, single-breasted coat, with a breast cord and tassel of the color of the corps, the department or the branch of the service, and light blue trousers, with a strip of the color of the corps or branch of the service. The service uniform, worn in garrison, consists of a sack coat of olive-drab woolen cloth for winter and of khaki for summer. It has the same ornamentation as the dress coat, with full dress and service uniforms. The cap is worn, but this is replaced by the felt hat for field service. Officers' uniforms correspond to those of the men, but the coats are more elaborate, and the ornamentations show the rank. A colonel's shoulder straps have a silver eagle; a brigadier-general's, a silver star; a major-general's, two silver stars; and a lieutenant-general's, three silver stars. When off duty, officers may wear civilian dress.

NAVAL UNIFORMS. In the United States navy the dark navy blue is the uniform color, but in warm weather the service coat of white linen duck, trimmed with white braid, is worn. The uniform of enlisted men are designated as blue dress, blue undress, white dress, white undress, blue working dress and white working dress. Dress uniform is worn on all occasions of ceremony. On ordinary occasions undress uniform is worn. Working uniforms consist usually of old uniforms, either blue or white. Officers have eight suits of uniforms required for different occasions. These are designated as dress, undress and service dress. The dress uniforms are special full dress, full dress, dress, evening dress A, evening Dress B and mess dress. The coats of officers' uniforms bear the insignia of rank.

Naval uniforms of all nations bear a close resemblance, the differences consisting largely in the insignia and ornamentation.

CIVIL UNIFORMS. Civil uniforms are those worn by members of organizations, such as Masonic fraternities and those required of their employees by great

corporations, such as railways, and they differ widely in style and color.

Union City, N. J., a city of Hudson County, on the west bank of the Hudson River, opposite New York City, and adjoining Jersey City and Hoboken on the north. It is on the New York Central (West Shore branch), the Erie, and the New York, Susquehanna & Western railroads. Ferries, electric railway tubes, a vehicular tunnel, and Fort Lee Bridge, about six miles north of the city, connect it with New York City. It is also on the Lincoln Highway. Union City was formed in 1925 from a consolidation of the former Union, or Union Town, and West Hoboken. It is an industrial center, producing broad silks, ribbons, embroideries, clothing, perfume, and soap. Population 63,600.

Uniontown, Pa., a mining center and the county seat of Fayette County, about 40 miles southeast of Pittsburgh, on the Pennsylvania and the Baltimore & Ohio railroads. It has a municipal airport. Uniontown is the distributing center for an extensive coal-mining district, where iron ore, glass sand, and natural gas are also abundant. Agriculture and dairying are also important industries of the surrounding region. The leading products manufactured in the city are bee-hive coke, boilers, radiators, enamelware, and builders' supplies. The place was founded by Henry Beeson in 1768 and was first called Beesontown. It was incorporated as a borough in 1796 and as a city in 1916. Population, 15,692.

U'nita'rians, a religious denomination whose members accept as their central doctrine the unity of God, as opposed to the belief in the Trinity, or Father, Son and Holy Spirit. They emphasize the Beatitudes and the Golden Rule and adopt no formal creed. The essence of their faith may be thus summarized: "We believe in the fatherhood of God, the brotherhood of man, the leadership of Jesus, salvation by character and the progress of mankind upward and onward forever." Modern Unitarians can be traced back to the time of the Reformation, and England had a Unitarian Church as early as 1774. In America, Unitarianism became a permanent and influen-

UNITED CONFEDERATE VETERANS

tial religious movement under William Ellery Channing. According to figures issued by the denomination, there are about 119,000 adherents and about 500 clergymen. See CHANNING, WILLIAM ELLERY.

United Confederate Veterans, an association of the officers, soldiers and sailors of the army and navy of the Confederate States of America, organized at New Orleans in 1889. Its purposes are social, literary, historical and benevolent. The organization has given much attention to gathering information for an impartial history of the war between

UNITED STATES

the states, and to the assistance of needy members, and especially the widows and orphans of Confederate soldiers. State organizations are known as divisions. The headquarters are at New Orleans and there are about 55,000 members. The *Confederate Veteran*, published at Nashville, Tenn., is the official organ.

The United Daughters of the Confederacy is a woman's organization composed of the widows, wives, mothers and sisters of those who served honorably in the army or navy of the Confederate States. The Sons of Veterans is composed of the sons of those who were in the Confederate army or navy.



UNITED STATES, a republic of North America. Excluding its external possessions it occupies the central part of North America. It extends from 49° north latitude on the north to 24° 30' on the south, and from 67° to 125° west longitude. It is bounded on the n. by Canada, on the e. by the Atlantic Ocean, on the s. by the Gulf of Mexico and Mexico and on the w. by the Pacific Ocean. The northern boundary is very irregular. Going eastward from the Pacific Ocean, it passes through the straits of Juan de Fuca Haro and Georgia to the 49th parallel of latitude on the coast of the mainland. It follows this parallel eastward to the Lake of the Woods. From the southeast corner of that lake it follows a chain of lakes and rivers to Lake Superior, thence it follows the deepest channel of the Great Lakes bordering on Canada to the St. Lawrence River, thence midway the channel of the river to parallel 45, along this parallel to the Connecticut River, thence in a northeasterly direction along the height of land to the most northern point of Maine, thence eastward along the St. Francis and the St. John rivers to the New Brunswick boundary, south along this boundary to the St. Croix River and along this river to Passamaquoddy Bay. The southern boundary between the United States and Mex-

ico begins about latitude 32° 32' n. on the Pacific Coast and extends east to the Colorado River, thence 20 m. south along that river, thence southeast for 160 m. to the line 31° 20', thence north to latitude 31° 47', thence east to the Rio Grande, thence along that stream to its mouth. The Canadian boundary is 3700 m. long and the Mexican 2105 m. The coast line, including rivers and lakes, is 11,075 m. in length.

AREA, COAST WATERS AND ISLANDS.

Area. The area of the United States proper is 3,026,789 sq. m., of which 2,973,776 sq. m. are land. The total area of the United States and its possessions is in round numbers 3,700,000 sq. m. The greatest length from east to west is 3100 m.; from north to south, 1780 m. The United States, with its dependencies, is the fourth great country of the world and is nearly as large as all Europe. It is exceeded in area by the empire of Great Britain, and by China and Russia.

Coast Waters. In general, the coast is free from deep indentations, though the northern part of the Atlantic coast contains numerous small bays, some of which form good harbors. The large

UNITED STATES AND ITS POSSESSIONS

The gross area of the United States is 3,026,701 square miles. The land area amounts to 2,973,686 square miles, and the water area—exclusive of the area in the Great Lakes, the Atlantic, the Pacific, and the Gulf of Mexico, within the three-mile limit—amounts to 53,015 square miles. The population of continental United States was 105,710,620 in 1920.

The southernmost point of the mainland is Cape Sable, Fla., which is in latitude 25° 07' and longitude 81° 05'.

The easternmost point of the United States is West Quoddy Head, near Eastport, Me., in longitude 66° 57' and latitude 44° 49'; the westernmost point is Cape Alva, Wash.; in latitude 48° 10', which extends into the Pacific Ocean to longitude 124° 45'.

From the southernmost point in Texas due north to the forty-ninth parallel, the boundary between the United States and Canada, the distance is 1,598 miles. From West Quoddy Head due west to the Pacific Ocean the distance is 2,807 miles. The shortest distance from the Atlantic to the Pacific across the United States is between points near Charleston, S. C., and San Diego, Cal., and is 2,152 miles.

ALASKA

Alaska was purchased from Russia in 1867 for \$7,200,000. It was constituted a territory in 1912 with a legislative assembly of eight senators and sixteen representatives which meets biennially in June.

The area of Alaska is 590,884 square miles, for every ten square miles of which there is one inhabitant, the total population being 55,036. Juneau is the capital and largest town with 3,058 inhabitants. Other important centers are Ketchikan, 2,458; Anchorage, 1,856; Sitka, 1,175; Fairbanks, 1,155; Cordova, 955; Douglas, 919; Petersburg, 879; Nome, 852; Wrangell, 821; Seward, 652; and Skagway, 494.

GUAM

Guam is the most southerly of the islands of the Mariana Archipelago in the Pacific. It has an area of 210 square miles and a population of 14,996, only a few hundred of whom are white. The seat of government is at Agaña; Piti is the port of entry.

HAWAII

The Hawaiian Islands were annexed to the United States in 1898 and two years later were constituted a territory. The inhabited islands are Hawaii, 4,015 square miles; Maui, 728; Oahu, 600; Kauai, 544; Molokai, 261; Lanai, 135; Niihau, 97; and Kahoolawe, 69. The total area is 6,449 square miles and the population numbers 255,912, 60% of whom are Japanese and Chinese. Honolulu, the capital, has 83,327 inhabitants.

PANAMA CANAL ZONE

The Panama Canal Zone was acquired from the Republic of Panama by a treaty signed November 18, 1903. Under the terms of the treaty, the United States, on the payment of \$10,000,000 and for an annual rental of \$250,000, is granted the use in perpetuity of a zone extending five miles from each side of the Canal. The cities of Colon and Panama which lie within the designated area remain under the control of Panama. The Canal Zone as delimited has an area of 502 square miles and a population of 23,671. Administrative headquarters are at Balboa. There is one railroad closely following the route of the Canal and connecting Panama and Colon.

PHILIPPINE ISLANDS

The Philippine Islands, numbering over 3,000, were ceded to the United States by Spain at the conclusion of the Spanish-American War. The total area of the islands is 114,400 square miles.

The total population in 1920 was 10,455,180. Manila, the capital and leading industrial center, has 285,306 inhabitants. Other large cities are: Iloilo on the island of Panay, 49,114; Cebu on Cebu, 65,502; Albay on Luzon, 52,756; Laoag on Luzon, 30,798; Zamboanga on Mindanao, 30,798.

PORTO RICO

The island of Porto Rico, like the Philippines, was acquired from Spain in 1898. The local government of both colonies is similar. Over a senate and house of representatives elected by the people is a governor-general appointed by the President of the United States. Porto Rico is represented in Congress by a resident commissioner.

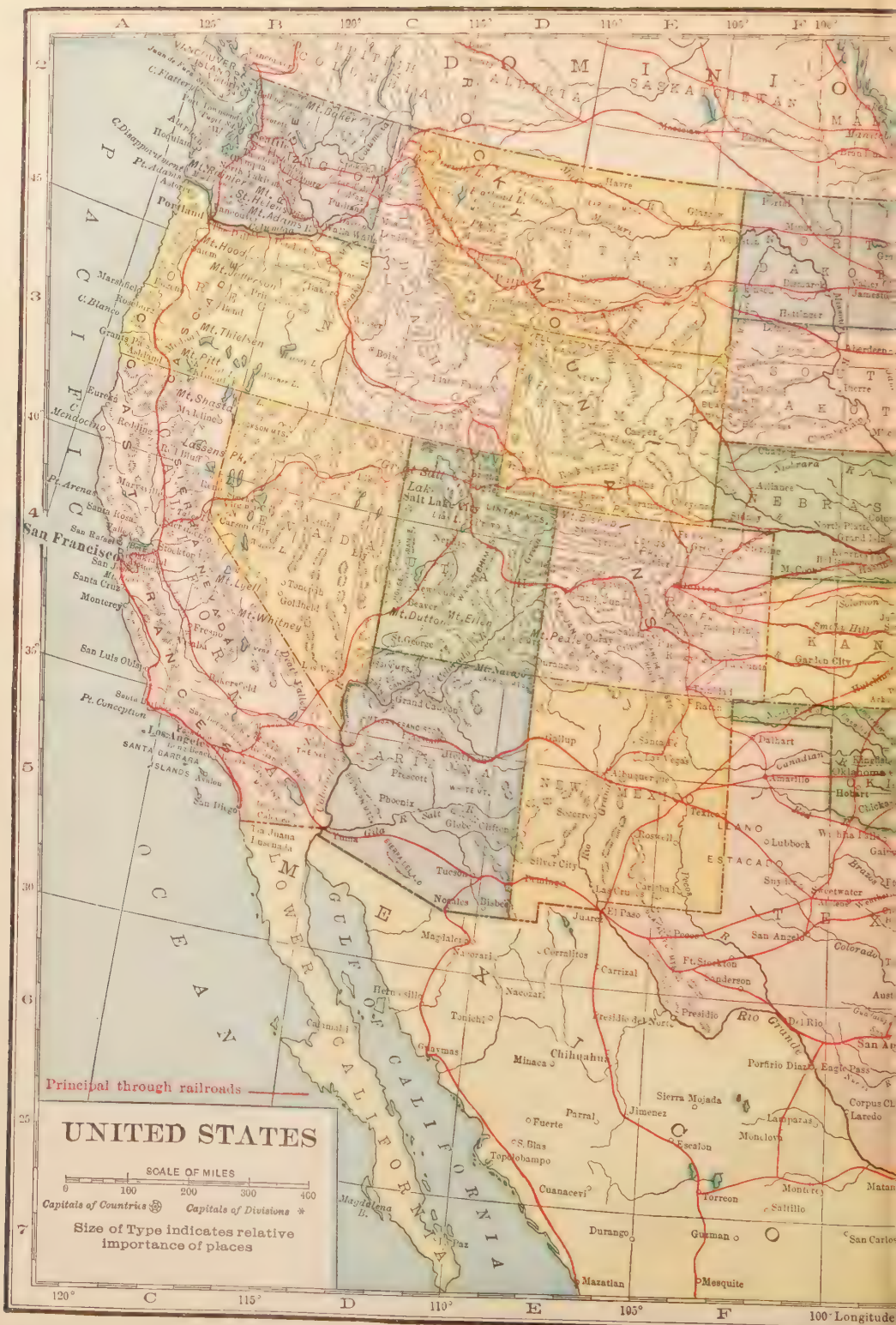
The island has an area of 3,435 square miles and a population of 1,299,809, it being one of the most densely populated regions in the world. The capital, San Juan, has 71,443 inhabitants; Ponce 41,912; Mayaguez 19,124.

SAMOA

American Samoa consists of a number of small islands with a total area of 58 square miles and a population of 8,058. The chief value of the islands is the harbor of Pago Pago where a naval station is maintained.

VIRGIN ISLANDS

The Virgin Islands were purchased from Denmark in 1917 for \$25,000,000. There are three main islands, St. Thomas, St. Croix, and St. John with an area of 132 square miles and a population of 26,051. St. Thomas, Christiansted, and Frederiksted are the important towns.





Hammond's 8 x 11 Map of the United States
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NATIONAL PARKS OF THE UNITED STATES

National parks in order of creation	Location	Area in square miles	Distinctive characteristics
Hot Springs... 1832	Middle Arkansas	1	16 hot springs possessing curative properties—Many hotels and boarding houses—20 bath-houses under public control.
Yellowstone..... 1872	Northwestern Wyoming	3,468	More geysers than in all rest of world together—Boiling springs—Mud volcanoes—Petrified forests—Grand Canyon of the Yellowstone, remarkable for gorgeous coloring—Large lakes—Many large streams and waterfalls—Vast wilderness, greatest wild bird and animal preserve in world—Exceptional trout fishing.
Sequoia..... 1890	Middle eastern California	1,544	The Big Tree National Park—Several hundred sequoia trees over 10 feet in diameter, some 25 to 36 feet in diameter—Towering mountain ranges—Startling precipices—Mile-long cave of delicate beauty.
Yosemite..... 1890	Middle eastern California	1,115	Valley of world-famed beauty—Lofty cliffs—Romantic vistas—Many waterfalls of extraordinary height—3 groves of big trees—High Sierra—Waterwheel Falls—Good trout fishing.
General Grant..... 1890	Middle eastern California	1	Created to preserve the celebrated General Grant Tree, 35 feet in diameter—6 miles from Sequoia National Park.
Mount Rainier..... 1899	West central Washington	324	Largest accessible single peak glacier system—28 glaciers, some of large size—48 square miles of glacier, 50 to 500 feet thick—Wonderful sub-alpine wild flower fields.
Crater Lake..... 1902	Southwestern Oregon	249	Lake of extraordinary blue in crater of extinct volcano—Sides 1,000 feet high—Interesting lava formations—Fine fishing.
Wind Cave..... 1903	South Dakota	17	Cavern having many miles of galleries and numerous chambers containing peculiar formations.
Platt..... 1904	Southern Oklahoma	1	Many sulphur and other springs possessing medicinal value.
Sullys Hill..... 1904	North Dakota	11	Small park with woods, streams, and a lake; is an important wild-animal preserve.
Mesa Verde..... 1906	Southwestern Colorado	77	Most notable and best preserved prehistoric cliff dwellings in United States, if not in the world.
Glacier..... 1910	Northwestern Montana	1,544	Rugged mountain region of unsurpassed Alpine character—250 glacier-fed lakes of romantic beauty—60 small glaciers—Precipices thousands of feet deep—Sensational scenery of marked individuality—Fine trout fishing.
Rocky Mountain... 1915	North middle Colorado	3,971	Heart of the Rockies—Snowy range, peaks 11,000 to 14,255 feet altitude—Remarkable records of glacial period.
Hawaii..... 1916	Hawaii	186	Three separate areas—Kilauea and Mauna Loa on Hawaii, Haleakala on Maui.
Lassen Volcanic..... 1916	Northern California	124	Only active volcano in United States proper—Lassen Peak 10,465 feet—Cinder Cone 6,879 feet—Hot springs—Mud geysers.
Mount McKinley... 1917	South central Alaska	2,645	Highest mountain in North America—Rises higher above surrounding country than any other mountain in the world.
Grand Canyon..... 1909	North central Arizona	958	The greatest example of erosion and the most sublime spectacle in the world.
Lafayette..... 1919	Maine coast	8	The group of granite mountains upon Mount Desert Island.
Zion..... 1919	Southwestern Utah	120	Magnificent gorge (Zion Canyon), depth from 800 to 2,000 feet, with precipitous walls—Of great beauty and scenic interest.

indentations along this coast are Penobscot, Cape Cod and Massachusetts bays, Long Island Sound, New York, Delaware, Chesapeake bays and Albemarle and Pamlico sounds. On the Gulf of Mexico are Tampa, Mobile and Galveston bays. On the Pacific coast are Santa Barbara and San Pedro channels, the Bay of Monterey, San Francisco Bay and Puget Sound.

Islands. The United States has but few large islands; off the Atlantic coast are Long Island and groups of smaller islands to the northeast. The Florida Keys are the chief group in the Gulf of Mexico, and the Santa Barbara Islands are the chief group off the Pacific coast.

SURFACE. The surface of the United States is naturally divided into five divisions as follows: the Atlantic Coast Plain, the Appalachian Highlands, the Central Plain, the Rocky Mountain Highlands and the Pacific Coast Region. For a detailed description of these regions, see the subhead *surface* in the articles describing the respective states.

The Atlantic Coast Region. The Atlantic Coast Plain comprises the region between tidewater and the Appalachian Highlands on the Atlantic coast and between tidewater and the Central Plain on the Gulf of Mexico. This region is narrow at the north, where the mountains are near the shore, so that in some localities the lowlands are only a series of foothills that merge into the mountains. The soil is generally rocky and difficult to till. That portion extending southward from Long Island is frequently called the Coastal Plain. As we proceed southward, the lowland gradually widens and that part next the coast is low, nearly level and, in general, poorly drained. Immediately back of this low plain is a more fertile strip, having a steeper slope and better drainage. This strip extends inland from 50 to 100 m., until it meets the foothills of the Appalachian Mountains, which are covered with forests. Along the Gulf of Mexico this plain extends around the southern end of the Appalachians and thence northward until it merges into the Cen-

tral Plain. In the Atlantic coastal region, the territory first settled by Europeans, occurred some of the most eventful episodes in American history.

The Appalachian Highlands. The Appalachian Highlands extend from the Laurentian Highlands in Canada almost to the Gulf of Mexico. It is a long narrow strip of country containing a number of parallel mountain ranges, with intervening valleys and in the north numerous isolated groups and peaks. These ranges are of the oldest mountains on the continent, and they have been worn to rounded summits by glacial action and weathering. The highest summits are Mt. Mitchell (6711 ft.) and other peaks of the Black Mountains in North Carolina and Mt. Washington in New Hampshire (6286 ft.). In the valleys between the ranges are some of the most charming mountain lakes in the country. The western slope of the Appalachian system descends gradually until it blends with the Central Plain. See APPALACHIAN MOUNTAINS; ADIRONDACK MOUNTAINS; CATSKILL MOUNTAINS; GREEN MOUNTAINS; WHITE MOUNTAINS.

The Central Plain. The Central Plain extends from the Appalachian Highlands on the east to the Rocky Mountain Highlands on the west. It comprises the southern part of the Great Central Plain of the United States and is divided into three sections, the prairies, the Great Lakes and the Great Plains.

The prairies comprise that portion of the Central Plain south of the Great Lakes and north of the Ohio River, on the east of the Mississippi and on the west of the Mississippi, that portion north of the Missouri River and westward to the Great Plains, with which they imperceptibly blend. The surface is rolling or level, and with scarcely an exception this vast region is covered with a highly fertile soil that in a past geological age was ground to the fineness of powder by glacial action. With abundant rainfall and a salubrious climate, the prairies constitute the most valuable agricultural region of the world.

The divide which separates the region of the Great Lakes from the prairies is scarcely discernible. This section contains the greatest body of fresh water on the globe and lies partly in the United States and partly in Canada. Its outlet is through the St. Lawrence River, which, with the lakes, forms a most important waterway. See GREAT LAKES.

The Great Plains form the western part of the Central Plain and extend westward from the border of the prairie to the Rocky Mountains, and southward include the Staked Plains of Texas. They rise gradually as we go westward and in places reach altitudes of 4000 or 5000 ft. In South Dakota they are broken by the Black Hills, an isolated range of mountains whose altitudes are over 7000 ft. South of the Missouri River is another system of highlands extending eastward from Arkansas nearly across Illinois. In Arkansas the system is called the Ouachita Mountains, and in Missouri they are known as the Ozark Mountains or Ozark Plateau. In their natural state the plains and prairies are treeless and are covered with a dense growth of grass, upon which formerly the large herds of buffalo fed. The grass is equally nutritious for cattle.

The Rocky Mountain Highlands. This region consists of a broad plateau extending from Canada to Mexico, upon which rise several ranges of mountains. The plateau varies in altitude from 4000 to 8000 ft. and in width from 150 m. in the north to nearly 1000 m. in Colorado and Wyoming. Upon its eastern border rises the Front Range of the Rocky Mountains, and upon its western border are the Cascade Mountains in the north and their continuation, the Sierra Nevadas, in the south. All the ranges are of more recent formation than the Appalachian Mountains, and the mountains are, in general, characterized by steep slopes and sharp-pointed peaks. The highest summits in the Rocky Mountains are in Colorado, where there are 40 peaks exceeding 14,000 ft., though none reaches 14,500 ft. In the Cascade Mountains are a number of detached

volcanic peaks, noted for their altitude and grandeur. Beginning at the north, the most noted of these are Mt. Baker (10,827 ft.), Mt. Rainier (14,408 ft.), Mt. Adams (12,470 ft.) and Mt. Hood (11,253 ft.). The Sierra Nevadas are also noted for the grandeur of their scenery. Mt. Whitney (14,502 ft.) is the highest mountain in the United States. In general, the Sierra Nevadas may be considered as a block, more than as a range of mountains. Their western slope descends to the Pacific Coast region and is very abrupt. See ROCKY MOUNTAINS; CASCADE RANGE; SIERRA NEVADA MOUNTAINS.

Between the Front Range of the Rocky Mountains and the Cascades and Sierra Nevadas there are numerous minor ranges, many of which are not parallel to those bordering the plateau.

Thus the surface of the plateau is very complex and irregular. In a general way these cross ranges divide the plateau into three well-defined regions. The most northerly, known as the Columbia Plateau, includes most of the states of Washington, Oregon, and Idaho. The southern region, known as the Colorado Plateau, includes most of Colorado, a portion of Utah, New Mexico, southern California and a small corner of Nevada. The region is characterized by many peaks, deep gorges and canyons, through which flow rapid streams fed by mountain snows. The entire region is semiarid and vegetation is scant, except where irrigation is practiced.

South of the Columbia Plateau and west of the Colorado Plateau lies the Great Basin. It includes nearly all of Nevada, a portion of Utah and parts of Idaho, Oregon and California. It is an elevated plateau surrounded by mountains and has a rough, uneven surface. The region received its name because there is no outlet for its drainage. One of the depressions in the northern part is filled with Great Salt Lake, and another in the southern part forms Death Valley, near the head of the Gulf of California and 276 ft. below sea level.



(1, 3, 4) © International; (2) Courtesy of the National Park Service of the Department of the Interior.

SCENES FROM AMERICA'S NATIONAL PARKS. (1) "Snookie" permits himself to be photographed with the great Yosemite Falls as a background. (2) El Capitan, in Yosemite National Park. (3) The Lower Canyon in Yellowstone National Park. Inset: Lassen Peak, in Lassen National Park, the only active volcano in the United States.



AVALANCHE LAKE IN GLACIER NATIONAL PARK
A Paradise for lovers of grandeur in natural scenery.

This is the lowest point in North America. All of the Great Basin is arid, but the soil is fertile and produces abundant crops when irrigated.

The Pacific Coast Region. West of the Cascade and Sierra Nevada mountains and separated from them by fertile valleys is the Coast Range. The most important valleys are those of the Sacramento and the San Joaquin rivers in the central and southern part of California, and the Valley of the Willamette in Oregon. The mountains of the Coast Range are lower than those farther inland, and their western slopes are well watered and heavily timbered, except in the south (See COAST RANGE). Between the coast ranges and the seaboard is a narrow strip of fertile land. In the extreme south, however, irrigation is necessary for agriculture.

LAKES. All of Lake Michigan and more than half of lakes Superior, Huron, Erie and Ontario belong to the United States. In the Appalachian region are many beautiful mountain lakes, such as Lake Champlain, Moosehead Lake and Lake Winnepesaukee. In Michigan, Wisconsin and Minnesota are hundreds of small lakes and there are numerous lakes in the Rocky Mountain region. All these are described in connection with the state in which they are located, or under their respective titles.

RIVERS. The drainage systems of the United States are as follows: the St. Lawrence system, the Atlantic system, the Gulf system, the Mississippi system and the Pacific system. With the exception of the St. Lawrence, the rivers of that system are short and small, but the St. Lawrence, as the outlet of the Great Lakes, is one of the most important rivers in North America. The Niagara River, which forms a part of this system, is one of the world's famous rivers because of the great cataract and the gorge below. See NIAGARA FALLS AND RIVER; ST. LAWRENCE RIVER AND GULF.

On the New England coast the St. Johns, Penobscot, Kennebec, Merrimac, Androscoggin, and Connecticut rivers are the largest. In the North Atlantic section

the Hudson, the Susquehanna, and the Delaware cut their way through the mountains and are navigable for some distance. In the southern section the most important are the Potomac, the James, the Pedee, the Neuse, the Santee, the St. Johns, the Savannah, and the Altamaha.

The rivers belonging to the Gulf system are separated by the Mississippi into two groups. The principal streams east of the Mississippi are the Suwannee, the Appalachicola, the Mobile, the Pascagoula and the Pearl. Those west of the Mississippi are all in Texas. They are the Sabine, the Brazos, Trinity, the Colorado (of Texas), the Nueces and the Rio Grande, which, with its chief tributary, the Pecos, drains a large area. See RIO GRANDE.

The Mississippi system drains the vast interior occupied by the Central Plain, and is the largest and most important river system, not only in the United States but in all North America. Its chief tributaries are the Ohio, the Missouri, the Arkansas, the St. Francis, and the Red. Not only is this system important for drainage, but it also forms a system of inland waterways, with a mileage of 14,000 m. See MISSISSIPPI RIVER.

The two great rivers in the Pacific system are the Columbia, which is navigable for ocean steamers to Portland, Ore., and the Colorado, famous for its Grand Canyon (See COLUMBIA RIVER; COLORADO RIVER). Other rivers are the San Joaquin, the Sacramento, the Klamath, and the Salinas.

CLIMATE. *Temperature.* The climate of the extreme southern part of the United States is subtropical, that of the northern part cool temperate. Except in the Rocky Mountain region the temperature is not materially modified by altitude. In the extreme southern part the average annual temperature is 75° and in the extreme northern part it is 50°. The direction of the mountain ranges allows north and south winds to sweep over all the Central Plain, and consequently this region is subject to sudden changes in temperature. Owing to the influence of the warm current in

the Pacific, the Pacific coast region has a much warmer climate than regions on the Atlantic coast having the same latitude. For local conditions, see subhead *Climate* in the articles describing the respective states.

Rainfall. That portion of the country east of 100° west longitude has sufficient rainfall for agriculture, and the southeastern portion of this region has from 40 to 60 inches. A small area bordering on the Gulf of Mexico has over 60 inches. Between the 100th meridian and the western slopes of the Cascade and Sierra Nevada mountains is a vast arid region, a large portion of which has from 10 to 20 inches of rain, but a large area, including most of Nevada, the western parts of Utah and Arizona and most of southern California, is practically a rainless district, due to the fact that the mountains near the coast rob the incoming winds of their moisture. The Coast Range, Cascades and Sierra Nevadas precipitate the moisture of the ocean winds, and their western slopes receive an abundant rainfall, as do the valleys to the west of them. On the western coasts of Oregon and Washington the rainfall exceeds 60 inches, and this accounts in a great measure for the dense forests of gigantic trees found in this locality. The western slopes of all these mountains are heavily timbered.

MINERALS AND MINING

The United States has boundless mineral resources, which include almost every known metal, all varieties of mineral fuels, and a great variety of other non-metallic minerals, such as stone, phosphate rock, cement rock, sand, clay, salt, feldspar, fuller's earth, asphalt, sulphur, gypsum, mineral waters, borax, zinc white, arsenious oxide, graphite, magnesite, mica, pumice, talc, etc. The yearly value of all the mineral products of the United States is about \$5,500,000,000.

COAL AND COKE. There are more than 300,000 square miles of coal measures in the United States, exclusive of Alaska, an area more than six and a half times the area of Pennsylvania. The chief

measures are in Pennsylvania, West Virginia, Ohio, Kentucky, Indiana, Illinois, and Alabama, though deposits of great value occur in Missouri, Iowa, the Dakotas, and other states west of the Mississippi. Anthracite is found only in eastern Pennsylvania. Bituminous coal occurs east of the Mississippi and some is found west of it, though most of the measures west of the river are lignite. The United States leads the world in coal production. See **COAL**.

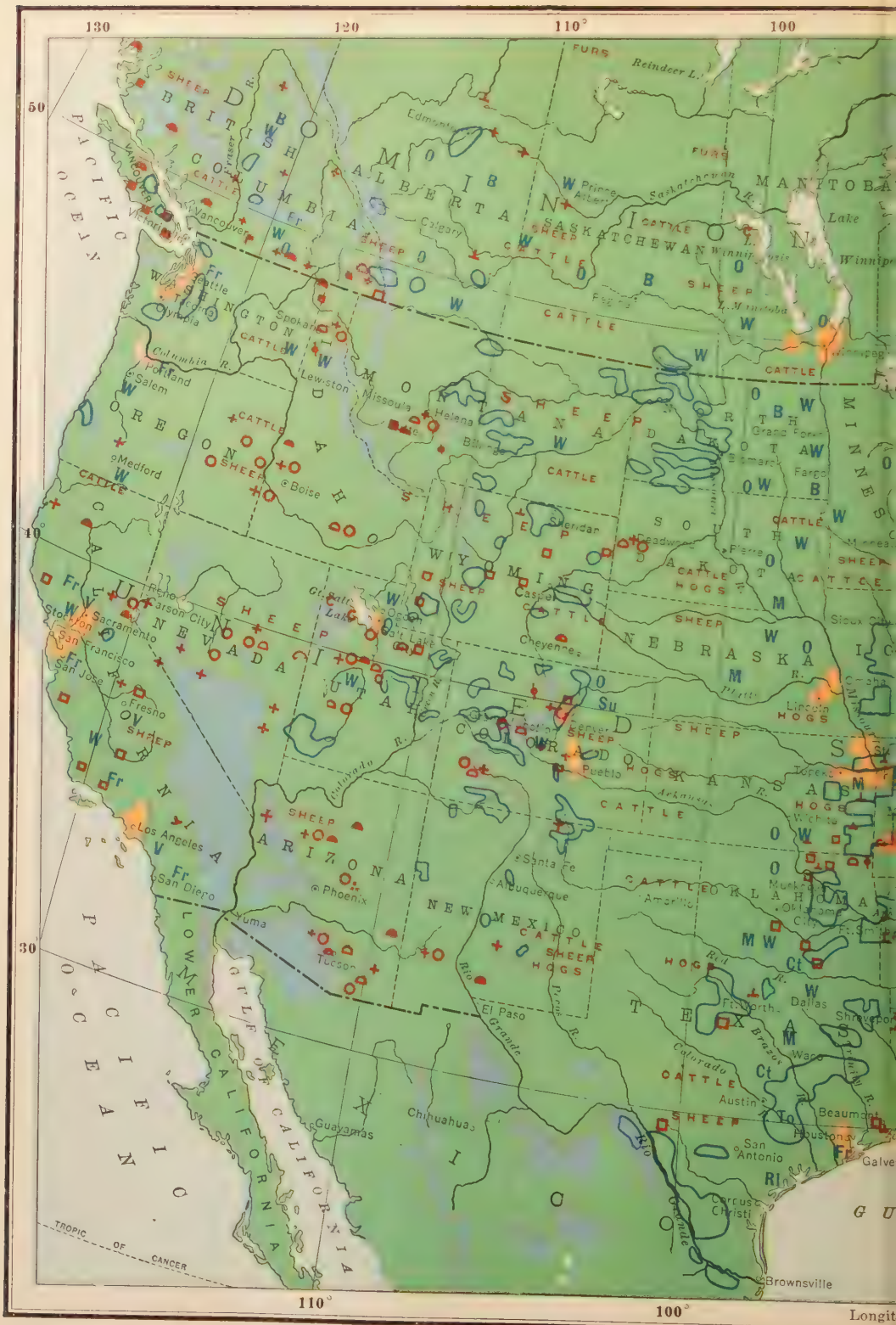
The by-product coke and beehive-oven coke industries are important. Pennsylvania, Ohio, Indiana, Alabama, and New York are the leading producers of by-product coke. See **COKE**.

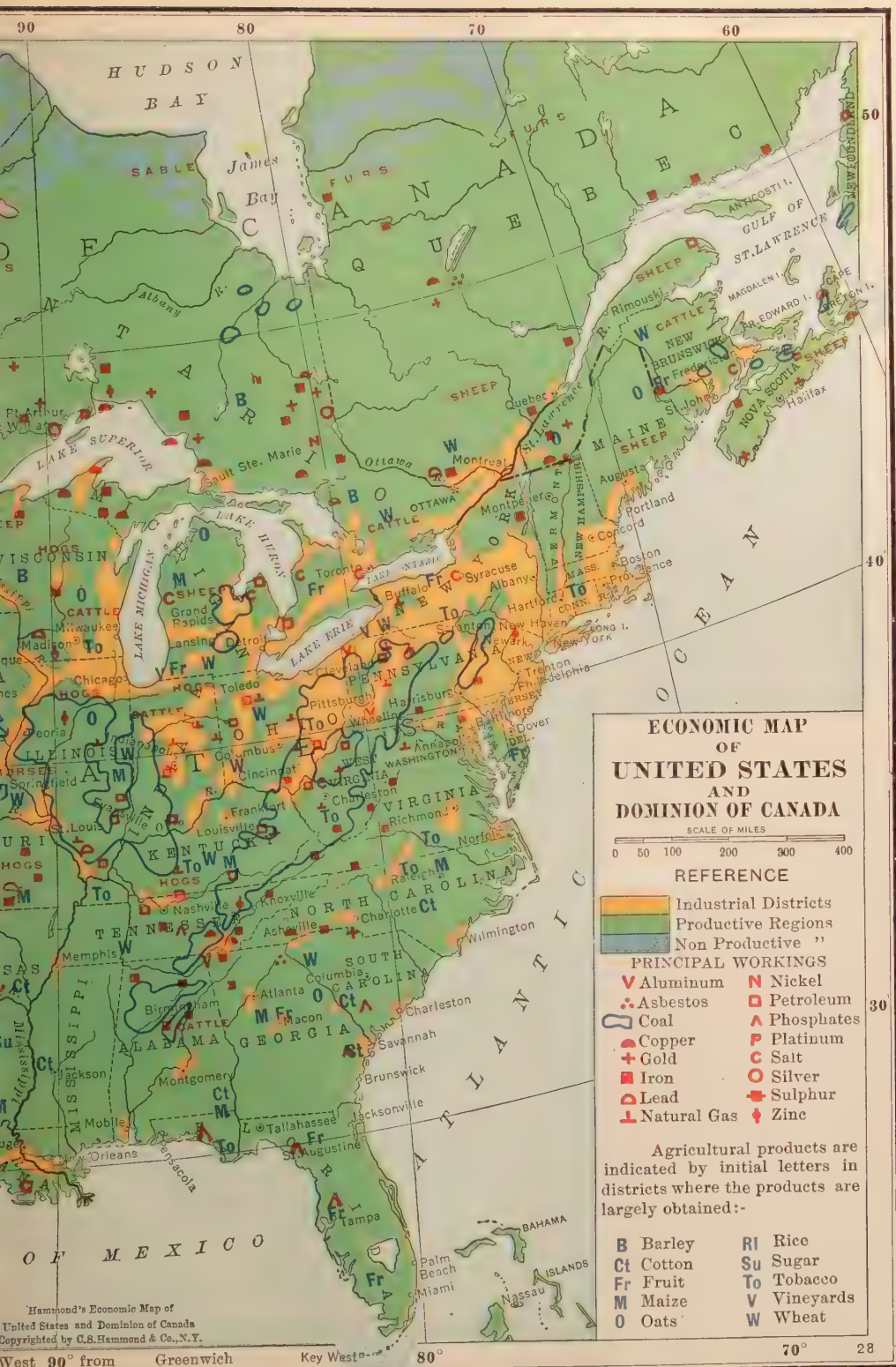
PETROLEUM AND NATURAL GAS. The other industry producing mineral fuel—petroleum and natural gas—ranks second in the value of products. Petroleum was first discovered in Pennsylvania in 1859. Since then oil fields have been found in many states. The regions of largest production are in Oklahoma, California, Texas, Kansas, Arkansas, Louisiana, Wyoming, Pennsylvania, and Ohio.

Natural gas occurs in localities where petroleum is found. Oklahoma is the largest producing state, followed by California, Texas, Louisiana, Pennsylvania, Ohio, and Wyoming. See **NATURAL GAS**.

IRON. The supply of iron ore is practically unlimited. The deposits are widely distributed, those of the greatest value being in the Lake Superior region of Minnesota and Michigan. Minnesota produces more than half of the country's total output. The second largest producing area is in the Southeastern States, especially in the Birmingham, Ala., and the Chattanooga, Tenn., districts. The Northeastern States rank next, with Pennsylvania the largest producer. The leading states rank as follows: Michigan, Minnesota, Alabama, Pennsylvania, and Wisconsin. The United States is the world's leading country in the production of iron and steel. See **IRON AND STEEL**.

GOLD. Gold has been found in many localities in the United States, but the largest mines are in the Rocky Mountain and Pacific coast regions and in South Da-





kota. The discovery of gold in California in 1848 was an epoch-making event in the history of the country. For nearly 50 years California led the world in gold production. It still leads the United States; South Dakota is second; and other leading states are Colorado, Arizona, Utah, and Nevada. The United States is second only to the Union of South Africa in gold production. See **GOLD**.

SILVER. Silver is found throughout the Rocky Mountains and Pacific coast regions. It is usually combined with lead and copper (See **METALLURGY**). Utah, Montana, Idaho, Arizona, and Nevada are the leading states in its production. Mexico is the world's chief silver-mining country and the United States is second. See **SILVER**.

COPPER. Arizona mines more than twice as much copper as any other state. Other important mines are situated in Utah, Montana, Michigan, Nevada, and New Mexico. More than one-half of the world's copper comes from the United States. See **COPPER**.

OTHER METALS. Lead, zinc, ferro alloys, and aluminum are produced in large quantities and antimony, platinum, mercury, and manganese ore are mined in paying quantities. Missouri, Idaho and Utah are the leading states in lead production and Oklahoma, Kansas, Montana, and New Jersey produce the largest quantities of zinc.

STONE. The United States has the largest granite, marble, and slate quarries in the world. The chief granite quarries are in California, North Carolina, South Carolina, Massachusetts, Arizona, Wisconsin, Pennsylvania, and Georgia. Vermont and Tennessee have the largest output of marble, and Vermont and Pennsylvania produce the largest amount of slate. Limestone and sandstone are widely distributed; the largest quarries are found in Pennsylvania, Ohio, Illinois, Michigan, Indiana, New York, and West Virginia. Basalt is quarried extensively in California, Connecticut, New Jersey, and Pennsylvania. The stone quarried yearly in the country is valued at about \$200,000,000.

FORESTS AND LUMBER.

FORESTS. The forests of the United States cover about 860,000 sq. m., an area equal to the combined areas of Texas, California, Montana, Nevada, Colorado, Missouri and Connecticut. It is estimated that this forest contains 2500 billion feet of merchantable timber. The area is divided into several groups. The northern forest covers northern New England and New York, the northern parts of Michigan, Wisconsin and Minnesota and most of southern New York and Pennsylvania, with a southern extension along the Appalachian Mountains as far as northern Georgia. It comprises chiefly soft woods, with an admixture of hard woods. It is the chief source of white pine, though the supply is nearly exhausted. The southern forest extends from Chesapeake Bay, through the South Atlantic and Gulf states into eastern Texas, with an extension northward into Arkansas and Oklahoma. It comprises soft woods with a slight admixture of hard woods. It is the source of hard, or Georgia, pine and cypress.

The central forest is composed chiefly of hard woods and it formerly covered southern New England, the valleys of the Hudson and Mohawk rivers, the Piedmont Plateau and the country from the Appalachians to the prairies, but its area has been greatly diminished by clearing the land for agriculture. The other forests comprise the forested areas in the Rocky Mountains and Pacific coast areas. Those in Washington, Oregon and California are the most dense on the continent. They are composed chiefly of soft woods, the Douglas fir and California redwood predominating. About one-fourth of the standing timber is on government land. A number of national forest reserves, including the national parks, have been established, and timber cannot be cut in government forests except under regulations of the Federal Bureau of Forestry. See **FORESTRY**.

LUMBERING. Lumbering is the third industry in value in the United States.

Washington is the leading lumber state, followed by Louisiana, Oregon, Mississippi, Wisconsin, Arkansas, North Carolina, Texas, California, Michigan and Virginia. See LUMBER.

FISHERIES. The fisheries of the United States are the most exclusive and valuable in the world. They are divided into three divisions, those on the Atlantic coast, those on the Pacific coast and those on the inland waters. The combined fisheries employ about 168,000 men, 5,500 vessels and over 64,000 boats, and the yearly value of their products is \$75,000,000. See FISHERIES.

MANUFACTURES.

EXTENT AND VALUE. The United States is the leading manufacturing country of the world. The special census of 1920 (the last on manufactures) gave 290,105 establishments, with a combined capital of \$44,466,593,771 and employing an average of 9,096,372 wage earners. The value of the total output of these establishments was \$62,418,078,773 and of the raw material used \$37,376,380,283. These statistics however, are based wholly upon those establishments which are ranked as factories, and the products of local shops, small sawmills and gristmills and of hand labor, which in the aggregate will amount to nearly as much more, are not included. The great value, therefore, of the manufactured products of the United States on a conservative estimate approaches the enormous sum of 125 billion dollars, or nearly \$1,200 per capita of population.

LEADING INDUSTRIES. The five leading industries in point of value are the manufacture of food products, including meat packing, milling, canning of fruits and vegetables and the preparation of special foods; the manufacture of iron and steel; the manufacture of textiles, including cotton and woolen goods, hats and carpets; the production of lumber and lumber products; and the manufacture of chemicals and allied products. The value of the food products is distributed as follows:

Butter, cheese and condensed milk	\$1,066,125,000
Canning and preserving fruit, vegetables, fish and oysters	628,287,925
Chocolate and cocoa.....	139,258,296
Confectionery and ice cream	637,209,168
Flour and grist milling...	2,147,218,913
Glucose and starch.....	186,256,250
Rice cleaning and polishing	90,038,412
Slaughtering and meat-packing	4,246,290,614
Sugar (beet and cane)...	888,326,173

LOCATION. Each manufacturing industry seeks the location which combines the largest number of advantages, such as proximity to raw material and power, either coal or water power, nearness to market, transportation facilities and expense of rent, taxes and labor. Because of these conditions manufactures are unevenly distributed. The nine leading manufacturing states, measured by the value of their products, are New York, Pennsylvania, Illinois, Massachusetts, Ohio, New Jersey, Connecticut, Indiana and Wisconsin. Massachusetts leads in the manufacture of cotton goods and woollens, including carpets, and boots and shoes. Pennsylvania is first in tanning and finishing leather. New York is first in the manufacture of clothing and in the variety of her industries, and Connecticut is noted for her great variety of small wares, such as buttons, thread, clocks and plated ware.

TRANSPORTATION AND COMMUNICATION.
WATERWAYS. According to the latest report of the Inland Waterways Commission, the United States has over 25,000 m. of navigable rivers, fully one-half of which belong to the Mississippi and its tributaries. The rivers flowing into the Atlantic are navigable only for short distances, but those flowing into the Gulf of Mexico are navigable for greater distances. In all, there are about 290 rivers used in navigation. There are also 360 m. of state canals and 632 m. of private canals, not including the government canals on the Great Lakes.

UNITED STATES

The Great Lakes, with their connecting rivers and canals and the St. Lawrence River, with its canals, form the most important system of inland waterways in the world. Ships drawing 14 ft. of water can pass directly from ports on the lakes to the Atlantic, but most of the ocean traffic passing over this route is transferred to large vessels at Montreal. About 43 per cent of the tonnage in American waters, carried by American vessels, is carried on the Great Lakes. The lakes are connected with the Hudson River by the Erie Canal, which furnishes an outlet for large quantities of produce raised in the prairie region. About 100,000,000 tons of freight and over 16,000,000 passengers are carried on the lakes each year. About one-half the freight is iron ore, one-fourth coal; then follow lumber, grain, flour and miscellaneous articles. See SAULT STE. MARIE CANALS; ERIE CANAL; WELLAND CANAL.

RAILWAYS. The first railway line in the United States was constructed in 1809, but no roads of importance were constructed until 1830, and two years later there were less than 25 m. of railway in the country. In 1921 there were over 262,544 m., a greater mileage than that of all Europe. In general, the railways extend east and west and north and south. Connecting lines have been united into great systems, each with many branches, which act as feeders to the main line. The main lines of some of the largest systems have a double track, and the New York Central has four tracks between New York City and Buffalo. Railways are most numerous in the older states, and all states east of the Mississippi have ample railway facilities. The states bordering on the Mississippi on the west are also well supplied. Six transcontinental lines extend from the Mississippi to the Pacific coast. Going from the north southward these are the Great Northern, the Milwaukee, St. Paul & Puget Sound, the Northern Pacific, the Union Pacific, the Santa Fe and the Southern Pacific. The great railway centers along the Atlantic sea-

UNITED STATES

board are Boston, New York, Philadelphia, Baltimore, Charleston and Savannah. Mobile, New Orleans and Galveston are the most important Gulf centers. The great inland centers are Pittsburgh, Buffalo, Cleveland, Cincinnati, Chicago, St. Louis, Omaha and St. Paul. In the Pacific States they are Seattle, Portland, San Francisco and Los Angeles. See RAILROAD.

ELECTRIC RAILWAYS. In 1922 there were over 47,150 m. of electric railway in the country. Much of this mileage is connected with the street railway system of large cities, but many lines join near-by towns, forming local systems of interurban transportation for both passengers and freight that are of great convenience and value. See ELECTRIC RAILWAY.

ROADS. The Bureau of Public Roads is a part of the Department of Agriculture. The Federal Road Act, passed in 1916, gave a great impetus to rural road-building among the states by appropriating large sums of the national funds for that purpose. The states must pay at least one-half the cost of production and pay for the maintenance of the roads. There are nearly 20,000 miles of federal-aid roads in the country, and about an equal mileage of roads constructed without federal aid. The two finest highways in the country are the Lincoln Highway, which crosses the continent from east to west, and the Dixie Highway, which traverses it from north to south.

OTHER AGENCIES. The telegraph, telephone and postal systems are fully treated under their respective titles. See POST OFFICE; TELEGRAPH; TELEPHONE.

COMMERCE.

FOREIGN COMMERCE. The foreign commerce of the United States for the fiscal year ending June 30, 1919, amounted to \$11,826,556,919. Of this amount, \$3,904,406,327 represented imports and \$7,922,150,592 exports. The United States ranks first among the nations of the world in their foreign commerce, having surpassed Great Britain and Germany.

The percentage of foreign trade carried in American ships has been greatly increased in recent years. The leading seaports on the Atlantic coast are New York, Boston, Philadelphia and Baltimore. On the Gulf coast they are New Orleans, Galveston, Mobile, Pensacola and Key West. On the Pacific coast they are Seattle, Tacoma, Portland, San Francisco, San Pedro and San Diego. New York is the most important commercial and financial center, and fully one-half of the foreign commerce passes through her port.

INTERNAL COMMERCE. Vast as is the foreign commerce of the United States, that carried on between the different sections of the country is much larger. This is due to the great variety of products and industries in the different localities, the high standard of living maintained by the American people, the excellent transportation facilities and the fact that trade between the states is free. Records of our international commerce are not kept, so that there is no means of arriving at an exact estimate of the amount, but Mr. O. P. Austin, chief of the Federal Bureau of Statistics, has estimated it "to exceed in magnitude the total international commerce of the world."

POPULATION.

PRESENT CONDITIONS. The census of 1920 showed the population of the United States and noncontiguous territory to be 107,508,855, not including the population of the Philippine Islands; and the population of continental United States to be 105,710,620, a gain in ten years of 13,738,354, or 35.5 per cent. The average number of inhabitants to the square mile is 30.9. The most densely populated state is Rhode Island, with 566.4 inhabitants to the square mile, and Nevada, with 0.7 inhabitant to the square mile, is the most sparsely populated. The country ranks fourth in population among the great countries of the world, being exceeded by China, India and Russia. It has nearly as many people as France and Germany combined. It con-

tains five-sixths the population of North America and nearly twice the population of South America. If the United States were as densely populated as Europe it would contain over 300,000,000 inhabitants, and if it were as densely populated as the British Isles, it would contain over a billion people.

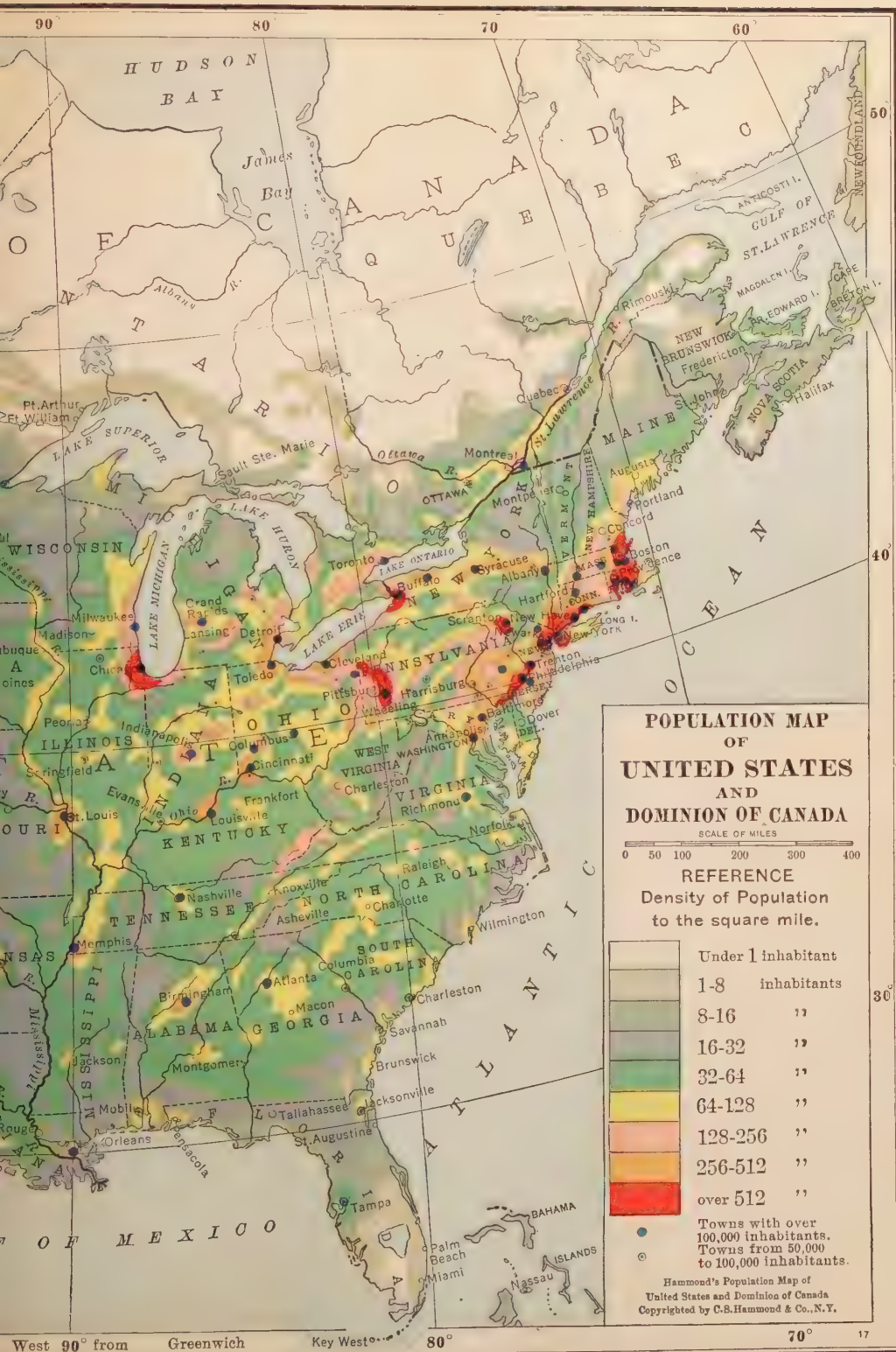
RACES. The 13 colonies were settled almost entirely from the British Isles, and the English were by far the most numerous nationality. Intermingled with them were Scotch and Irish. The Dutch settled in New York, and there were a few Swedes in New Jersey and Delaware, but there were not sufficient numbers of these nationalities to have any effect upon the nation as a whole, and until after the middle of the 19th century the white people of the United States were almost wholly of English descent.

Negroes. The first negroes were introduced into the country in 1619 and in the years that followed others were imported. After the Revolutionary War they were practically confined to the South, because industrial conditions made them unprofitable in other sections of the country. In 1790 they constituted one-fifth of the population. At the breaking out of the Civil War they numbered over 4,000,000, and in 1920, 10,463,131 or about one-tenth of the whole. Most of the negroes still remain in the Southern States, though there is a growing tendency to move to the large cities. While the percentage of the negro population in 1920 was 9.9 for the entire country it was 23 per cent for cities of 25,000 inhabitants and over.

Other Races. In 1920 there were 182,137 Chinese, Japanese and other Asiatics in the country, most of whom were in the Pacific States, and 244,437 Indians on the various reservations in the country.

IMMIGRATION. Previous to 1800 no record of immigration was kept, but it was estimated that about 4000 immigrants arrived each year. From 1800 to 1870 the number was approximately





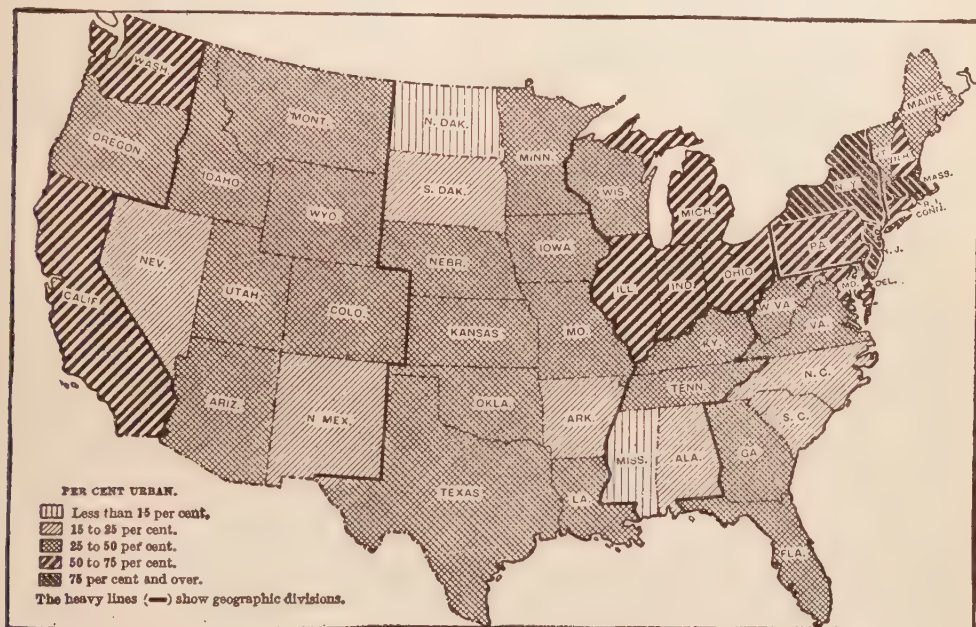
6,000,000. Since 1870 the annual influx has been much greater.

Prior to the World War immigration annually was considered over a million, during the war it greatly decreased. After the war legislation was passed restricting immigration. See IMMIGRATION.

GROWTH OF CITIES. Each succeeding census has shown a larger proportion of the inhabitants living in cities. In 1790 only 3.3 people out of every 100 lived in

54.7; and in 1920, 59.9.

CENTER OF POPULATION. In 1790 the center of population was about 23 miles east of Baltimore. From that time to the present it has moved westward along the 39th parallel, and in 1920 it was in southwestern Indiana, in Owen County. Between 1910 and 1920 it moved westward approximately 9.8 miles, while it moved northward only two-tenths of a mile. The total westward movement from 1790 to 1920 was 567 miles. The map



cities of 8000 or more inhabitants. In 1840 the proportion had increased to 8.5 per 100. In 1850 over one-eighth of the people lived in cities of 8000 or more, and since then the population has increased rapidly. In 1890 there were in the country 7,907 incorporated places with a population of 27,056,333; in 1900 there were 10,731 places with a population of 36,681,966; in 1910 the number of places was 14,145 with a population of 50,335,269; and in 1920 there were 15,692 places with a population totaling 63,273,844. In 1890 the per cent of the population living in incorporated places was 43.0; in 1900 it was 48.3; in 1910

issued by the United States Census Bureau shows the location of the center of population at each census.

GOVERNMENT.

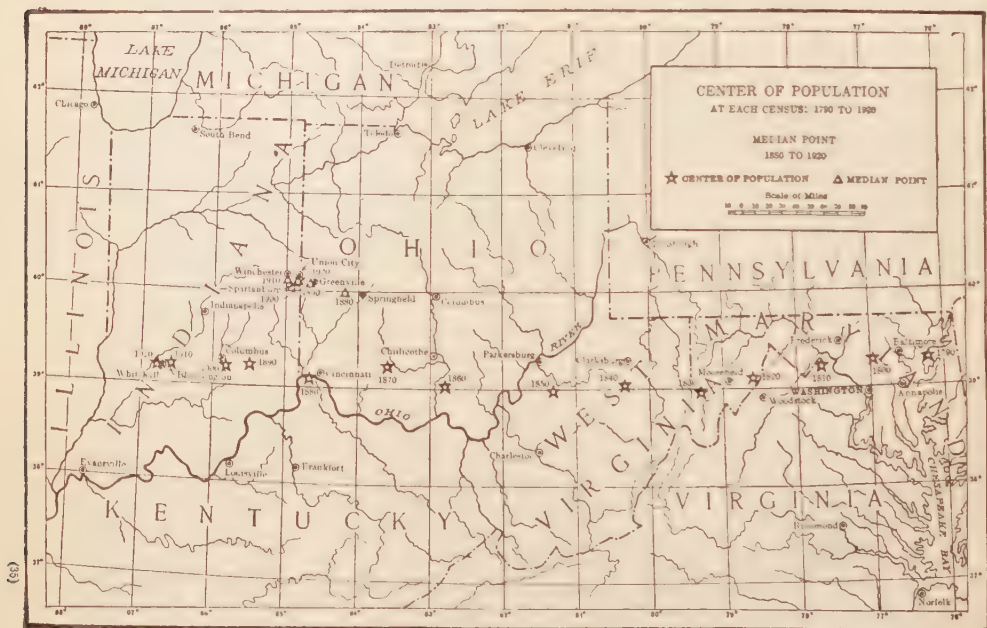
NATIONAL GOVERNMENT. The United States is a Federal republic, whose government is based on the Constitution of the United States and by that instrument is divided into three coordinate and independent departments, the legislative, the executive and the judiciary.

Legislative Department. The legislative department of the Federal Government is vested in a Congress of two branches—a House of Representatives

and a Senate. The House of Representatives consists of members apportioned to the states according to the population and elected by popular vote in the even-numbered calendar years. In most states the election is on the Tuesday following the first Monday in November, and the term begins on the fourth of March following.

The Senate is composed of two members from each state, 96 in all, and elected by popular vote. Senators are chosen

ment, who collectively form the president's cabinet, and such minor officials as are necessary for carrying on the work of these departments. Most of the higher officials in the executive department are appointed by the president and confirmed by the Senate. The others are under the civil service law. The chief duties of this department are to see that the laws are enforced. In addition to this, the president is commander-in-chief of the army and navy and of the militia



for a term of six years, but the Senate is divided into three classes, and the terms of one-third of the members expire every two years. The Constitution makes the vice-president the president of the Senate, but the body chooses one of its own members president *pro tempore*, who presides in the absence of the vice-president. See CONGRESS; SPEAKER; CONSTITUTION OF THE UNITED STATES.

Executive Department. The executive department consists of the president, the heads of the departments of the govern-

ment when called into the service of the United States. See PRESIDENT; CABINET; also articles on the departments of STATE, INTERIOR, TREASURY, WAR, NAVY, POST OFFICE, JUSTICE, AGRICULTURE, COMMERCE and LABOR.

Judicial Department. The judicial department comprises the Supreme Court of the United States and such other courts as from time to time have been established by Congress. The chief duty of these courts is to try cases in which the United States is a party or those cases

in which State Courts do not have jurisdiction owing to the nature of the question at issue or citizenship of the parties interested. Judges for the United States courts are appointed by the president and confirmed by the Senate. The term is for life, or during good behavior. See COURT; SUPREME COURT; CIRCUIT COURT OF APPEALS; DISTRICT COURT.

STATE GOVERNMENT. Previous to the Revolutionary War the colonies were governed under charters that had been granted by the British Parliament. Seven colonies had governors appointed by the Crown, and the others elected their governors. All had a Legislative Assembly. In some it consisted of two branches and in others of only one. When the colonies became independent states, they retained their charters as the basis of constitution. As time passed, the old charters were either modified to meet the needs of new political conditions or were replaced by new constitutions. In either case the constitution resembled the charter in its main features. States admitted after the adoption of the Federal Constitution patterned their constitution after that of the Federal Government. Hence, except as to minor details, all state governments resemble the National Government. See the subhead *Government* in the state articles.

COLONIAL POSSESSIONS. Alaska and Hawaii have the usual territorial form of government. Porto Rico is governed by a commission in co-operation with a legislature elected by the citizens of the island. The Philippines enjoy a large degree of autonomous rule, the United States appointing the Governor-general and exercising the power of review over the acts of the legislature and proceedings of the courts.

FINANCE. The treasury department is at the head of the financial system. United States has the dollar valued at 100 cents for its standard unit. Coinage and the issue of all bank notes are in the hands of the government (See MONEY; BANKS AND BANKING). Congress has authority to lay direct taxes, but they must be uniform throughout the country.

However, this authority is exercised only in extreme emergencies, as in case of a prolonged war. The chief sources of revenue are customs, internal revenue, sale of public lands, including Indian lands, postal receipts and the income tax. The total income is about one billion dollars a year.

Money for government purposes is paid out only as appropriated by Congress; each Congress passes the Appropriation Bill, which corresponds to the English budget, and makes appropriations for meeting all government expenses. The chief sources of expenditure are salaries and other expenses of Congress and the various departments of government, pensions, support of the army and navy, expenses of the post office department, interest on the public debt and public works. The total expenditures for 1918 are about \$7,874,368,325. The public debt on May 31, 1920, amounted to \$25,290,456,911.00. The greater portion of this was occasioned by the participation of the United States in the European war, and is in the form of Liberty Bonds bearing interest at from $3\frac{1}{2}$ to $4\frac{3}{4}$ per cent.

ARMY AND NAVY. See ARMY, UNITED STATES; MILITIA; NAVY, subhead *United States*.

EDUCATION. For detailed accounts see COMMON SCHOOLS; UNIVERSITIES; subhead *Education* in the state articles.

RELIGION. The Constitution forbids the establishment of any particular form of religion or the requiring of any religious test as a qualification for office in the service of the United States. All religions and faiths are on equal footing before the law, and there are many denominations in the country. Those having the largest number of followers are the Roman Catholic, Methodist, Baptist, Lutheran, Presbyterian and Disciples of Christ, or Christian.

POLITICAL DIVISIONS. Continental United States contains 48 states and one Federal district, the District of Columbia. The following table contains interesting and valuable information concerning these states:

UNITED STATES

UNITED STATES

State	Popular Name	Capital	Gross Area in Square Miles	Rank in Area	Admitted to the Union	Population 1920	Inhabitants per Square Mile of Land Area	Rank in Population
Alabama....	The Cotton State....	Montgomery	51,998	28	1819	2,348,174	45.8	18
Arizona....		Phoenix....	113,956	5	1912	334,162	2.9	46
Arkansas....	The Bear State....	Little Rock..	53,335	26	1836	1,752,204	33.4	25
California....	The Golden State....	Sacramento..	158,297	2	1850	3,426,861	22.0	8
Colorado....	The Centennial State..	Denver....	103,948	7	1876	939,629	9.1	33
Connecticut	The Nutmeg State....	Hartford....	4,965	46	*	1,380,631	286.4	29
Delaware....	The Diamond State...	Dover.....	2,370	47	*	223,003	113.5	47
District of Columbia..			70	49		437,571	7,292.9	42
Florida....	The Everglade State..	Tallahassee..	58,666	21	1845	968,470	17.7	32
Georgia....	The Empire State of the South.....	Atlanta.....	59,265	20	*	2,895,832	49.3	12
Idaho....	The Gem of the Mountains.....	Boise.....	83,888	12	1890	431,866	5.2	43
Illinois....	The Prairie State....	Springfield..	56,665	23	1818	6,485,280	115.7	3
Indiana....	The Hoosier State....	Indianapolis..	36,354	37	1816	2,930,390	81.3	11
Iowa....	The Hawkeye State..	Des Moines..	56,147	24	1845	2,404,021	43.2	16
Kansas....	The Sunflower State..	Topeka....	82,158	13	1861	1,769,257	21.6	24
Kentucky....	The Blue Grass State..	Frankfort....	40,598	36	1792	2,416,630	60.1	15
Louisiana....	The Creole State....	Baton Rouge	48,506	30	1812	1,798,509	39.6	22
Maine....	The Pine Tree State..	Augusta....	33,040	38	1820	768,014	25.7	35
Maryland....	The Old Line State..	Annapolis...	12,327	41	*	1,449,661	145.8	28
Massachusetts..	The Bay State.....	Boston.....	8,266	44	*	3,852,356	479.2	6
Michigan....	The Wolverine State..	Lansing....	57,980	22	1837	3,668,412	63.8	7
Minnesota....	The Gopher State....	St. Paul....	84,682	11	1858	2,387,125	29.5	17
Mississippi....	The Bayou State....	Jackson....	46,865	31	1817	1,790,618	38.6	23
Missouri....	The Bullion State....	Jefferson City	69,420	18	1821	3,404,055	49.5	9
Montana....	The Treasure State...	Helena.....	146,997	3	1889	548,889	3.8	39
Nebraska....	The Tree Planter State	Lincoln....	77,520	15	1867	1,296,372	16.9	31
Nevada....	The Sage Brush State..	Carson City..	110,690	6	1864	77,407	0.7	49
New Hampshire..	The Granite State....	Concord....	9,341	43	*	443,083	49.1	41
New Jersey....	The Garden State....	Trenton.....	8,224	35	*	3,155,900	420.0	10
New Mexico....		Santa Fe....	122,634	4	1912	360,350	2.9	44
New York....	The Empire State....	Albany....	49,204	29	*	10,385,227	217.9	1
No. Carolina....	The Old North State..	Raleigh....	52,426	27	*	2,559,123	52.5	14
No. Dakota....	The Flickertail State..	Bismarck....	70,837	16	1889	646,872	9.2	36
Ohio....	The Buckeye State....	Columbus....	41,040	35	1803	5,759,394	141.4	4
Oklahoma....	The Boomer State....	Okla. City..	70,057	17	1907	2,028,283	29.2	21
Oregon....	The Beaver State....	Salem.....	96,699	9	1859	783,389	8.2	34
Pennsylvania....	The Keystone State...	Harrisburg..	45,126	32	*	8,720,017	194.5	2
Rhode Island..	Little Rhody.....	Providence...	1,248	48	*	604,397	566.4	38
So. Carolina....	The Palmetto State...	Columbia....	30,989	39	*	1,683,724	55.2	26
So. Dakota....	The Sunshine State...	Pierre.....	77,615	14	1889	636,547	8.3	37
Tennessee....	The Big Bend State...	Nashville....	42,022	34	1796	2,337,885	56.1	19
Texas....	The Lone Star State..	Austin....	265,896	1	1845	4,663,228	17.8	5
Utah....	The Salt Lake State..	Salt Lake City	84,990	10	1896	449,396	5.5	40
Vermont....	The Green Mountain State.....	Montpelier..	9,564	42	1791	352,428	38.6	45
Virginia....	The Old Dominion....	Richmond....	42,627	33	*	2,309,187	57.4	20
Washington....	The Evergreen State..	Olympia....	69,127	19	1889	1,356,621	20.3	30
W. Virginia....	The Panhandle State..	Charleston..	24,170	40	1863	1,463,701	60.9	27
Wisconsin....	The Badger State....	Madison....	56,066	25	1848	2,632,067	47.6	13
Wyoming....	The Equality State...	Cheyenne....	97,914	8	1890	194,402	2.0	48
Continental	United States.....		3,026,789			105,710,620	35.5	

*Original State.

CITIES. The growth of the cities has been rapid. The 1920 Census shows population of following fifty cities as:

1. New York	5,620,048
2. Chicago	2,701,705
3. Philadelphia	1,823,779
4. Detroit	993,678
5. Cleveland	796,841
6. St. Louis	772,897
7. Boston	748,060
8. Baltimore	733,826
9. Pittsburgh	588,343
10. Los Angeles	576,673
11. Buffalo	506,775
12. San Francisco	506,676
13. Milwaukee	457,147
14. Washington	437,571
15. Newark	414,524
16. Cincinnati	401,247
17. New Orleans	387,219
18. Minneapolis	380,582
19. Kansas City, Mo.	324,410
20. Seattle	315,312
21. Indianapolis	314,194
22. Jersey City	298,103
23. Rochester	295,750
24. Portland, Ore.	258,288
25. Denver	256,491
26. Toledo	243,164
27. Providence	237,595
28. Columbus	237,031
29. Louisville	234,891
30. St. Paul	234,698
31. Oakland	216,261
32. Akron	208,435
33. Atlanta	200,616
34. Omaha	191,601
35. Worcester	179,754
36. Birmingham	178,806
37. Syracuse	171,717
38. Richmond	171,667
39. New Haven	162,537
40. Memphis	162,351
41. San Antonio	161,379
42. Dallas	158,976
43. Dayton	152,559
44. Bridgeport	143,555
45. Houston	138,276
46. Hartford	138,036
47. Scranton	137,783
48. Grand Rapids	137,634
49. Paterson	135,875
50. Youngstown	132,358

LITERATURE. See **LITERATURE**, sub-head *American Literature*.

HISTORY.

DISCOVERY AND EXPLORATION. The Norsemen claim to have discovered the mainland of North America about 1000 A. D. and to have founded settlements in Greenland and at what they called Vin-

land, supposed to be within the boundaries of Rhode Island and Connecticut, but history generally accredits the discovery of the New World to Christopher Columbus, who, in 1492, discovered the Bahama Islands and in subsequent voyages the coasts of South and Central America. In 1497 and 1498 John and Sebastian Cabot sailed along the coast of Labrador, probably going as far south as New England, and it was upon their discoveries that England based her claim to the territory. Americus Vesputius explored along the coasts of South America at about the same time, and it was for him that America was named. In 1513 the Spaniard Balboa discovered the Pacific Ocean from the Isthmus of Darien, and the same year Ponce de Leon entered Florida. During the 16th century Frenchmen and Spaniards sent numerous expeditions to America in the endeavor to possess the untold wealth which they believed the country contained. In 1524 Verrazano made his voyage. Later he was followed by Cartier and others. De Soto discovered the Mississippi River in 1541. Cortez conquered and despoiled Mexico, and Pizarro and his followers overran Peru. From Mexico the Spaniards sent out expeditions into what is now the southwestern part of the United States. In the north the French under Cartier and Ribault were attempting to found French settlements.

During the first half of the 16th century England gave no attention to America, but soon after Elizabeth ascended the throne, interest was revived and a number of British navigators sought to extend British influence in the newly-discovered continent. The most prominent of these were Sir Francis Drake, Sir John Hawkins, Sir Humphrey Gilbert and Sir Walter Raleigh. Their voyages and attempts at colonization, doubtless, led the British Government to take greater interest in America, but beyond this they accomplished no permanent results. Although St. Augustine, Fla., was founded by the Spaniards in 1565, it was not until the 17th century

that any systematic effort to establish colonies in the New World was made. During the first half of this century the French, under the leadership of Champlain, the Jesuit missionaries, Joliet, Marquette, La Salle, and others, occupied the Valley of the St. Lawrence and the region around the Great Lakes, and the English founded settlements to the south, between the Atlantic seaboard and the Appalachian Mountains.

COLONIZATION. The first English colony in America was founded at Jamestown, Va., in 1607; the last in Georgia in 1733. The entire period between these dates, however, was not wholly devoted to founding settlements. Georgia was settled much later than the other colonies.

English Colonies. Jamestown was founded by the London Company, whose purposes were chiefly commercial, and the first settlers consisted of adventurers, drawn from all classes of society. Virginia established the social and political system for all the Southern colonies. She had the first Legislative Assembly in America (1619), and it was here that negro slavery was introduced in 1619.

The first settlement in New England was made at Plymouth, Mass., in 1620, by men who came to America to escape religious persecution (See *PILGRIMS*). In 1628 a settlement was made at Salem by English Puritans (See *PURITANS*). The name was afterwards changed to Massachusetts Bay Colony. Other settlements were made in the immediate vicinity, and in the course of 50 years the English colonists in Massachusetts were numerous and prosperous. As Virginia established the social and political customs and institutions for the Southern colonies, so did Massachusetts establish them for those in New England. Both had legislative assemblies, but the plans for managing local affairs were entirely different in the two colonies. The Massachusetts colonies emigrated by church congregations, and consequently the church became the center not only of the religious life but of the social and political as well. At the beginning each

church community was practically a law unto itself, and this was the origin of the New England town as the civil and political unit. Massachusetts was characterized by small farms and closely settled communities; Virginia by large estates and sparsely settled communities. In the latter the township was impracticable and the country was made a civil and political unit. With such modifications and blending as seemed necessary to meet local conditions, these two systems have continued in vogue and are in use throughout the country. Massachusetts was the first colony to establish free schools, to found a college and to set up a printing press.

Roger Williams founded Providence (1636) and Anne Hutchinson, Portsmouth. Later these settlements were united. Other settlers desiring greater freedom than was to be found in Massachusetts went westward and established settlements along the Connecticut River, which later developed into the Colony of Connecticut. In 1639 this colony adopted the first written constitution in America, known as the *Fundamental Orders of Connecticut*. The prosperity of the Massachusetts colonists led to founding settlements in New Hampshire and Maine, and others found their way into Vermont.

The Carolinas were settled by colonists from Virginia, but in 1663 the territory was granted to a number of English noblemen, by whom it was divided into two colonies. These were again united, however, in 1691 and remained under one government until 1729, when they were separated. Maryland was founded by Lord Baltimore as a refuge for persecuted Catholics. Pennsylvania was a proprietary colony founded by William Penn, on a grant of land made by the British Government in payment of a debt due his father. Most of the first settlers were Quakers and it was known as the "Quaker Colony." Georgia was founded by James Oglethorpe, whose purpose was to establish a refuge for honest debtors. The first settlement was made in 1733.



GRINNELL GLACIER, GLACIER NATIONAL PARK

Other Colonies. New Jersey was first settled by the Dutch at Ft. Nassau, now Gloucester, in 1623. It was conquered by the Swedes, but was restored to the Dutch, who held it until 1664, when it came into the possession of the English and became a proprietary colony of Sir George Carteret and Lord Berkeley. The Dutch made a settlement at Ft. Orange, now Albany, N. Y., in 1623, and at New Amsterdam, now New York, in 1626. Delaware was settled by the Swedes. In 1664 all these settlements were ceded to the English, and the name of New Amsterdam was changed to New York in honor of the Duke of York. For a more detailed statement of the history of each colony, see the subhead *History* in the articles describing the respective states.

STRUGGLE WITH FRANCE. During the 17th century both the French and English were extending and strengthening their American colonies, but the plans according to which this was done differed widely in the two nations. The English colonists established homes, tilled the soil and developed thrifty, industrious and reasonably compact communities.

During the period in which the English colonies were being developed into populous and thriving self-governed communities, the French were exploring and taking possession of the vast interior of the country. They had taken possession of the St. Lawrence Valley, the region around the Great Lakes, and, by the early part of the 18th century, of the Ohio and Mississippi valleys. The French colonists were actuated more by a desire to acquire wealth through the fur trade than by tilling the soil; consequently they had few large settlements, the largest being at Montreal and Quebec. Most of the other settlements in the North were military and trading posts. However, in locating some of the most important of these, the government had due regard for the protection of the frontier. It was not the intention of the French to allow the English to pass the barrier of the Appalachian Mountains and enter the rich country beyond. They

established forts at what is now Kingston, Ont.; at Sault Ste. Marie, Michilmackinac, Green Bay, Detroit, Niagara, Maumee and St. Joseph, at the southern end of Lake Michigan, and along the Ohio, Illinois and Mississippi rivers. They also founded settlements at Mobile, New Orleans and Biloxi.

Four wars, extending over a period of about 80 years, with varying intervals of peace, were the outgrowth of the struggles between France and England for prestige in Europe. For fuller detail of the conflict, see **FRENCH AND INDIAN WARS**. The final conflict resulted in the fall of Quebec in 1759 (See **QUEBEC, BATTLE OF**). By the Treaty of Paris, 1763, France surrendered to England all her possessions in North America east of the Mississippi River, excepting two small islands in the Gulf of St. Lawrence. Her possessions west of the Mississippi were ceded to Spain. This treaty was the turning point in American history. It determined the nationality of the continent; established beyond controversy a representative form of government; removed from the English colonies the danger that for more than a century had beset their frontier; brought the colonies into closer touch with each other; and prepared them to resist the encroachments of Great Britain.

THE REVOLUTIONARY WAR. *Causes.* The French secretary of state, on signing the Treaty of 1763, remarked that he had provided a way by which England would lose her colonies in America. This contingency England did not foresee, and instead of trying to remove all differences between the Mother Country and her colonies, she entered at once upon a series of aggressive measures that tended to aggravate the ill feeling previously existing. Soon after the founding of the first settlements Parliament enacted laws for restricting colonial trade, and these were followed by other measures from time to time as the prosperity of the colonies increased (See **NAVIGATION ACTS**). The colonists had always considered the Navigation Acts a just cause for grievance. They were

also dissatisfied because England was unwilling to give them free government to the extent they demanded.

During the last French and Indian War they had borne what they deemed their full share of the burden in supplying both troops and money. England's numerous wars had left her treasury empty, and the ministry sought to levy a tax on the colonies as a just share of their contribution towards the war in America, which Parliament claimed was undertaken in the colonies' behalf; thus in 1765 the Stamp Act was passed (See STAMP ACT). This measure the colonists declared to be contrary to the principles of the Magna Charta (See MAGNA CHARTA), and in violation of the fundamental laws of the realm. "Taxation without representation is tyranny," was their cry, and they opposed the enforcement of the Stamp Act with such vigor that it was soon repealed. But the repeal was accompanied by a declaration that "the Crown had authority to bind the colonies in all things whatsoever." This implied the right to levy taxes, and this aroused the wrath of the colonists as much or more than the Stamp Act. This declaration was followed by the Townshend Acts (See TOWNSHEND, CHARLES), and these provoked the colonists to retaliation. British troops were quartered in Boston, and an open rupture occurred between the troops and the citizens, in which several citizens were killed (See BOSTON MASSACRE). The colonies and the Mother Country were rapidly drifting apart. The ablest statesmen in the colonies saw little prospect of conciliation, and a movement was begun to unite the colonies in the common cause. Committees of Correspondence were established; non-importation and non-exportation societies were organized, whose purpose was to prevent all trade with Great Britain. The question of revenue gave place to that of power. All other taxes were repealed, and a quantity of tea with a tax of three pence a pound was sent to Boston. The tea was thrown into the harbor (See BOSTON TEA PARTY). The aggressions of some

naval officers caused the burning of the schooner *Gaspee*. These and other hostile acts by the colonists led to the passage of a number of retaliatory acts of Parliament. These were followed by calling the First Continental Congress, which met in Philadelphia, September, 1774. This Congress sent a memorial to the King, passed a general non-importation agreement and adjourned until May, 1775.

The colonies organized provincial governments to take the place of those established by the Crown, and began to organize militia and collect military supplies. General Gage, commander of the British forces in Boston, learning that such supplies were being collected at Concord about 20 m. away, on April 19, 1775, sent a detachment of troops to destroy them. The colonists were warned and the troops were met by minutemen at Lexington, where the first blood in the war for American independence was shed (See LEXINGTON, BATTLE OF). On the assembling of the Second Continental Congress, May, 1775, it was plain that war was inevitable and Congress took measures for national defense. George Washington was appointed commander-in-chief of the American forces and provisions were made for organizing, equipping and paying the army. On June 17 the Battle of Bunker Hill occurred (See BUNKER HILL, BATTLE OF). The result of this battle was a moral victory for the Americans and aroused the wildest enthusiasm throughout the colonies. For a detailed account see REVOLUTIONARY WAR IN AMERICA.

THE CRITICAL PERIOD. During the war the country suffered extremely from the weakness of the central government and the lack of financial resources. Volumes of paper money had been issued by Congress, all of which at the close of the war was practically worthless. The states were jealous of each other, and, overburdened by their own financial obligations, refused to grant money for national purposes. The nation had no credit at home or abroad; trade between states was obstructed by petty local tar-

iff; and as the common cause which held the states together during the war was removed, they were rapidly drifting apart. Washington and others saw that unless something was done to strengthen the central government, all would be lost. The Articles of Confederation adopted during the war were entirely inadequate to meet the situation (See CONFEDERATION, ARTICLES OF), and had it not been for the common interest which the states held in the public domain, the states might not have held together until a new government was formed. The Ordinance of 1787 awakened a special interest in this vast territory, which in a measure diverted the attention of the states from their petty jealousies (See ORDINANCE OF 1787). Meantime the Constitutional Convention had been called and provision made for a Federal Government much stronger than the old one.

ORGANIZATION OF THE FEDERAL GOVERNMENT. *Adoption of the Constitution.* The members of the Constitutional Convention divided into two factions. One, led by Hamilton, Madison, Jay and others, desired a strong central government; the others, championed by Lansing, Paterson, Yates and Luther Martin, favored a central government with decidedly limited powers and strong state governments. Franklin and others saw that unless an agreement of these factions could be effected, the convention would fail, and advocated compromises, to which a majority of both parties assented.

The Constitution was to become effective when adopted by nine states. When it was placed before the states for adoption, those members who did not approve of the compromises inaugurated a strenuous opposition to the document. In answer to these objections Hamilton and Madison wrote under the title of *The Federalist* a series of the most brilliant political essays in our literature (See FEDERALIST, THE). The opposition failed and by the end of 1788 the constitution had been ratified by all the states save Rhode Island and North Carolina. To meet the objections of those who feared

the effect of a strong national government, twelve amendments were proposed by the first Congress, and ten of them were ratified by the states.

Organization of the Government. Washington was unanimously chosen first president of the United States and took the oath of office in New York, April 30, 1789. Congress had already assembled and organized. As vice-president, John Adams presided over the Senate and Frederick A. Muhlenberg was chosen speaker of the House of Representatives. There were 26 members in the Senate and 65 in the House. The executive departments were established and Washington appointed Jefferson secretary of state, Hamilton secretary of the treasury and Henry Knox secretary of war. Hamilton and Jefferson represented opposite factions. Hamilton was in favor of a strong central government and Jefferson was opposed to it. The judiciary department, with the Supreme Court and inferior courts, was also founded. Washington's first term was occupied almost entirely with domestic affairs, among the most important of which were Hamilton's financial measures. These included the payment in full of the foreign debt and the debt due the citizens of the United States, the assumption of the state debts by the nation and the establishment of a United States bank and a mint. Although strenuously opposed by a minority in both branches of Congress, each of these measures was adopted. By this master stroke Hamilton at once gave the nation credit abroad and secured to the new government the support of all but the debtor class in the country. Excise and tariff laws were enacted to provide revenue for the government. Washington's first term was also notable for establishing certain precedents which have been followed to the present day.

During his second term Washington was harassed by both foreign and domestic difficulties. Among the latter were the Whiskey Insurrection in Pennsylvania (See WHISKEY INSURRECTION) and the Indian War in Ohio. Both were

put down, though the first expedition against the Indians met signal defeat. War broke out between England and France, and each nation found sympathizers in the United States. Already party lines were being drawn. The Federalists, the party of Hamilton, sympathized with England, and the Republicans, the party of Jefferson, were inclined to sympathize with France. To prevent entangling alliances Washington issued a proclamation of neutrality, which became an epoch-making document in international law. Neither nation, however, treated the United States with the respect due a neutral power. England interfered with American commerce upon the high seas and France sent one Genet as minister to the United States, who ignored the government and attempted to raise forces to operate against England. Genet's conduct widened the breach between England and the United States and for a time war was imminent. But Washington sent John Jay as a special minister to England, and he succeeded in negotiating a treaty which for a time allayed the ill feeling. As Washington's second term drew to a close he refused to be a candidate for reelection, issued his *Farewell Address*, and upon the inauguration of John Adams as his successor retired to his home at Mt. Vernon. See WASHINGTON, GEORGE.

POLITICAL PARTIES. Political strife became animated and even bitter during Adams' administration. The Federalists were rapidly losing their influence and power. Trouble with France reached such an acute stage that war was threatened, but fortunately the difficulty was practically adjusted. The harassed administration secured the passage of two laws designed to protect the government from criticism, but in their spirit and principle these laws were in violation of American institutions, and they reacted unfavorably upon the government (See ALIEN AND SEDITION LAWS; KENTUCKY AND VIRGINIA RESOLUTIONS). Adams' administration was unpopular and at the next election the Republicans came into

control, with Jefferson as president, and the party system, as it has since existed, was fully established. A detailed account of the rise and development of political parties is given in the article **POLITICAL PARTIES IN THE UNITED STATES**.

NATIONAL GROWTH. Jefferson's greatest act was the purchase of Louisiana, thereby more than doubling the area of the United States, obtaining possession of the Mississippi to the sea and preventing the possibility of a rival nation being founded to the west of that river (See LOUISIANA PURCHASE). During these years settlers had entered the Northwest Territory, and Kentucky, Tennessee and Ohio had been added to the family of states, the last in 1803. The census of 1800 showed an increase in population of over 35 per cent during the decade. Manufactures were being developed, commerce was increasing and the country was in a highly prosperous condition. But European politics decreed that this prosperity should be checked. France and England were constantly at war, and each tried to prevent the other from reaping any benefit through trade with the United States, and between them American ships were nearly driven from the seas. American ships were searched by British men-of-war for British subjects who were supposed to be sailing on them, and many were taken by force, some of whom were not British subjects. Jefferson thought by keeping American ships in port he would compel these powers to recede from their attitude because of their great need of American produce, so he secured the passage of the Embargo Act and later of the Non-Inter-course Act. But these laws only further crippled American commerce without producing any effect upon France and England. The laws caused much ill feeling and were soon repealed.

In one foreign affair, however, the United States gained well-deserved credit. For years the Barbary States had been preying upon the commerce of all nations in the Mediterranean, and their depredations were such during

Washington's administration that the government agreed to pay them an annual tribute to prevent further molestation of American vessels. Their piratical raids were resumed in Jefferson's administration, and the small navy of the United States began a warfare upon the pirates that soon led them to sue for peace, which they were ready to accept on almost any terms. This war put an end to piracy in these waters, and was equally beneficial to the nations of Europe and America. During Jefferson's second term Aaron Burr, who failed of election as president, attempted to organize a separate government in the Southwest to include the territory bordering on the Mississippi and Mexico, but his unpatriotic efforts were fruitless. See BURR, AARON.

WAR OF 1812. Jefferson was succeeded by James Madison. In the years immediately preceding his election many new men had entered Congress. Young and aggressive, these men were restive under the strictures forced upon the United States by Great Britain. Complaint was also made because the British had not given up all the frontier posts in accordance with the terms of the Treaty of Paris. On the other hand Great Britain claimed that the United States had not paid the Tories who fled to Canada on the outbreak of the Revolutionary War, for the losses they had incurred. A war party developed in Congress, and they agitated the question until finally war was declared against Great Britain. See WAR OF 1812.

THE ERA OF GOOD FEELING. Monroe's administration (1817-1825) was known as the Era of Good Feeling, because there was practically no opposition to his election. During this administration the Supreme Court rendered a number of decisions of lasting importance. Among other things they decided that a state could not tax a Federal agency; that the National Government could establish a corporation and that a state law which compelled the violation of a preexisting contract was not valid. See MARSHALL, JOHN.

In 1820 Missouri applied for admission into the Union, and this led to a controversy over slavery in Congress, a forerunner of many that were to follow (See MISSOURI COMPROMISE). The South American states had gained their independence and been recognized by the United States. All except Brazil had established a republican form of government. There was evidence of a combined attempt of some European nations, together with the Holy Alliance, to coerce these states, and this led Monroe to define the position of the United States in reference to the occupation of American territory by the nations of Europe. Such occupation would be considered an unfriendly act. The principles embodied in this declaration have been strictly followed. See MONROE DOCTRINE.

THE NEW DEMOCRACY. Monroe was followed by John Quincy Adams, whose administration was uneventful. With the election of Jackson a new regime was inaugurated in government affairs. The party which placed Jackson in the presidential chair took the name Democrats and with two exceptions won every presidential election between Jackson and Lincoln (See POLITICAL PARTIES IN THE UNITED STATES, subhead *Democratic Party*). Jackson inaugurated the Spoils System, vetoed a bill for rechartering the United States Bank and distributed the funds deposited in this bank among various state banks. This led to the wildest sort of speculation in public lands and was one of the chief causes of the great panic of 1837. Jackson's successor, Van Buren, inherited the results of some of Jackson's measures, the most far-reaching and important being the financial panic of 1837, which for a time completely paralyzed business and caused thousands of failures throughout the country. Van Buren established independent subtreasuries. This was the most important act of his administration, since these subtreasuries were the beginning of the present treasury system.

GROWTH OF SECTIONALISM. Between 1815 and 1840 the industrial growth of the country had been rapid. People

from the Eastern States had "gone West," and Ohio, Indiana and Illinois contained many thriving towns and villages, as well as thousands of well-tilled farms, whose produce was beginning to find its way to Eastern markets. South of the Ohio a similar development had taken place. Alabama and Mississippi had been admitted to the Union and were growing and prosperous states. Beyond the Mississippi, Missouri had been admitted as a state, and Iowa was being rapidly settled.

The states north of the Ohio were devoted to general farming, commerce and manufactures, but the Southern States had found cotton to be their great source of revenue. The invention of the cotton gin by Whitney at once placed the production of cotton on a paying basis, and the invention of the spinning frame and the power loom in England so increased the demand for cotton that its cultivation was rapidly extended. The climate of the Southern States was well suited to the negro, and slave labor was equally well suited to the cultivation of cotton; consequently slavery had naturally been extended throughout the cotton-growing states.

Thus two radically different industrial and social systems faced each other across the Ohio. With the development of the West, there came a strong demand for internal improvements at government expense. Harbors were needed on the Great Lakes, and, above all, roads were necessary. The National Road, begun in 1806 and completed in 1840, however, was the only one constructed at national expense (See NATIONAL ROAD). At first the South favored internal improvements, but later she opposed them. Again the Northern States generally desired a protective tariff because of their manufacturing interests. The Southern States, having no manufactures, naturally opposed a tariff and looked upon it as an added expense, which would confer no benefit upon them. In addition to this, the statesmen and politicians of the South were ardent advocates of "states' rights." They were

also anxious to maintain and even extend their peculiar industrial system. It was, therefore, inevitable that the members of Congress from the Northern and those from the Southern States should entertain opposite views on many questions of national importance, and as the interests of the respective sections became larger, the strife increased in bitterness. The first great controversy arose over the admission of Missouri. The next was over the tariff of 1828, which was stigmatized as the "Tariff of Abominations" (See TARIFF). This tariff was opposed by the South, because they believed it would cause Europe to discriminate against exports of the United States and thus affect the sale of cotton, and because they considered it unconstitutional. In 1832 South Carolina declared the tariff law "null and void" and prepared to resist its enforcement within her borders. President Jackson at once took vigorous steps to enforce the laws and South Carolina was compelled to recede from her position (See NULLIFICATION). A compromise tariff bill providing for the gradual reduction of duties was passed, and the breach was temporarily healed.

The most widely extended and most bitter of all controversies, however, was that over slavery. In the North there were many who did not believe that slavery should exist under a free government, and about 1830 some of them began to proclaim this belief through the public press. In 1831 William Lloyd Garrison established *The Liberator*, which became the organ of the abolitionist movement. The agitation of the abolitionists aroused bitter feeling throughout the South, notwithstanding the fact that the question of keeping slaves lay wholly within the power of the states themselves.

THE MEXICAN WAR. The admission of Texas was the chief issue in the election of 1844. Texas was formerly a part of Mexico, but in 1835 it seceded, defeated the Mexican forces and the following year established its independence. It had been settled largely by Americans



EDWIN M. STANTON



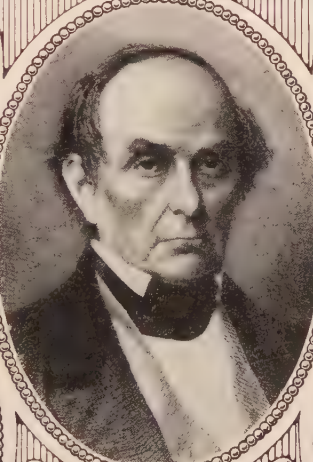
JOHN C. CALHOUN



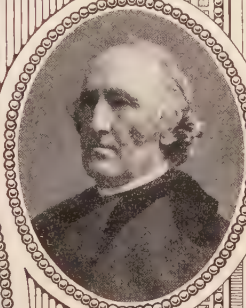
WM. H. SEWARD



EDWARD EVERETT



DANIEL WEBSTER



WENDELL PHILLIPS



ALEX. H. STEPHENS



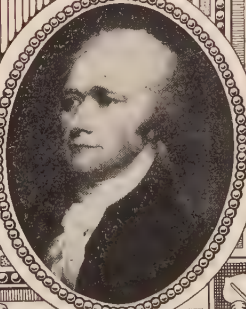
STEPHEN A. DOUGLAS



THOMAS H. BENTON



HENRY CLAY

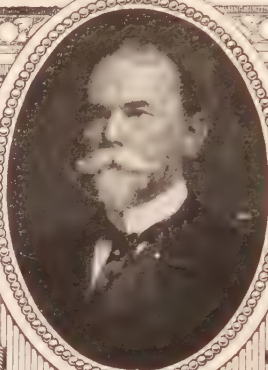


ALEX. HAMILTON

AMERICAN STATESMEN AND ORATORS



JOHN SHERMAN



JOHN HAY



ELIHU ROOT



ROScoe CONKLING



JAMES G. BLAINE



THOMAS B. REED



JOHN T. MORGAN



CHARLES SUMNER



JOHN J. INGALLS



WILLIAM J. BRYAN



HENRY W. GRADY

AMERICAN ORATORS AND STATESMEN

from the South, many of whom were slaveholders. The Southern statesmen, wishing to extend slave territory, strongly advocated the admission of Texas, while many from the North opposed its admission because they did not wish to extend slave territory. James K. Polk, a strong advocate of admission, was elected president, and Texas was admitted in 1845. The western boundary of Texas was not clearly defined, and a dispute over the territory led to the Mexican War. See MEXICAN WAR.

A PERIOD OF STRIFE. One of the first results of the war with Mexico was to intensify the strife over slavery. In the North the Free-Soil Party was yearly gaining in numbers. Many runaway slaves were secreted in the Northern States or secretly aided to escape to Canada (See UNDERGROUND RAILROAD). Throughout the North there was a general demand for the abolition of slavery in the District of Columbia. In 1848 gold was discovered in California. The rapid increase in population led California to apply for admission into the Union. Her constitution excluded slavery. Upon all these questions Congress was so divided that for a time no decision could be reached. In 1850 the Great Compromise, generally known as the Omnibus Bill, was passed. See COMPROMISE OF 1850.

After the admission of Texas there were no more slave states to be admitted unless they could be created out of territory acquired from Mexico. The Southern statesmen had planned to divide Texas into several states and thus increase the number of senators in their faction, but Texas refused to be divided. They then resorted to the doctrine of squatter sovereignty, which was, in brief, that territories should be thrown open to settlement, and at the time of their admission to the Union the question as to whether they were to come in as slave or free states should be determined by the inhabitants. This doctrine met with strenuous opposition in the North, since its embodiment in law would virtually repeal the Missouri Compromise. Another

cause of bitter contention was the Fugitive Slave Law. This law authorized the arrest of fugitive slaves wherever found and their return to their masters. See FUGITIVE SLAVE LAW.

The Kansas-Nebraska Bill was passed in 1854. This measure enacted the doctrine of squatter sovereignty into law and repealed the Missouri Compromise (See KANSAS-NEBRASKA BILL). It was the wedge which split the Democratic Party into Northern and Southern wings. It led to Civil War in Kansas (See KANSAS, subhead *History*), but failed to accomplish its desired purpose, the admission of Kansas and Nebraska as slave states. The Kansas-Nebraska Bill united all those opposed to the extension of slavery into a single party under the name Anti-Nebraska men. They carried the congressional elections in the North in 1854 and gained control of the House of Representatives in 1855. In 1856, joined by many Northern Democrats and Whigs, they held the first Republican National Convention and nominated John C. Fremont, who received 114 electoral votes. James Buchanan, the Democratic candidate, was elected, but the party's influence was greatly weakened; all but five of the free states had gone against it. During Buchanan's administration Minnesota and Oregon were admitted. Kansas applied for admission as a free state, but the opposition of Southern statesmen kept her out of the Union until after their withdrawal in 1861. Sectional feeling was still further aggravated by John Brown, who, in 1859, with a small band of deluded followers, attempted to capture Harper's Ferry, in Virginia (See BROWN, JOHN). The South believed this was the first movement towards arousing the slaves to insurrection. The Dred Scott decision, in which Chief Justice Taney attacked the validity of the Missouri Compromise, was almost universally resented in the free states. See DRED SCOTT CASE.

As the election of 1860 approached, the country was in a turbulent state. The Republican Party nominated Abraham Lincoln of Illinois on a platform opposed

to the extension of slavery. The Democratic Party split into two wings. The South, demanding that Congress protect slavery in the territories, nominated John C. Breckinridge of Kentucky; the Northern wing, resting upon squatter sovereignty, nominated Stephen A. Douglas of Illinois. A remnant of the old Whigs and Know-Nothings, calling themselves the Constitutional Union Party, nominated John Bell of Tennessee on a platform that called for the enforcement of the laws. Lincoln received 180 electoral votes; Breckinridge, 72; Bell, 39; and Douglas, 12. Previous to the election several slave states had declared that if the Republicans won they should withdraw from the Union, and they at once began preparing for such action.

CONDITIONS OF THE COUNTRY. Notwithstanding the political strife of the period, the country had been generally prosperous, though speculation led to a general business depression in 1857. The census of 1860 gave the population at over 31,000,000. Of this number 12,000,000 were in the slave states; one-third of whose population, or 4,000,000, were slaves. The railways had been combined into great trunk lines, so that the transportation of passengers and freight between the interior and the Atlantic seaboard was prompt and convenient. The reaper, invented by Cyrus H. McCormick in 1834, had come into general use and was a powerful factor in the rapid development of the rich lands of the great prairie states. The invention and improvement of other agricultural implements also enabled agriculture to make rapid strides along other lines. The great deposits of copper on Lake Superior had been discovered. The rotary printing press was supplying the people with papers and periodicals in larger number and at less expense than ever before. Elias Howe, by inventing the sewing machine, had relieved the women of the country of much household drudgery, and the discovery of the use of ether as an anæsthetic had given the American medical profession prestige abroad.

CIVIL WAR. The Civil War was not the result of caprice or impulse. The country had been approaching the crisis for half a century; each side had hoped that such a conflict might be avoided, but their efforts were in vain. In October, 1860, the governor of South Carolina sent letters to the governors of all the cotton states except Texas asking for their cooperation should South Carolina decide upon secession. The replies were favorable, and on Dec. 20 a state convention, called for the purpose, passed an ordinance of secession. See CONFEDERATE STATES OF AMERICA.

The states bordering on free territory did not wish to secede. Missouri was saved to the Union by the efforts of some of her citizens, as were Maryland and Kentucky, but Virginia joined the Confederacy. Thus at the time of Lincoln's inauguration the Confederate States had their government fully organized. The North, still trying to prevent war, proposed compromises in the form of amendments to the Constitution, but these proposals failed to pass Congress. All the members of Congress from the seceding states withdrew. Congress admitted Kansas, passed the Morrill Tariff Act of 1861 and adjourned. See CIVIL WAR IN AMERICA.

RECONSTRUCTION. The first great problem confronting Congress after the war was to devise a plan for restoring the seceded states to the Union. The rejoicing over the close of the war was suddenly turned to mourning over the untimely death of President Lincoln, who was assassinated Apr. 14, 1865. Lincoln's death was a great barrier to the pacification of the South. Andrew Johnson succeeded to the presidency, and a hopeless struggle between the President and Congress followed, during which time many abuses crept into the government of the conquered states. See RECONSTRUCTION; SLAVERY, subhead *United States*; also the subhead *History* in the articles describing each of the Southern States.

The differences between President Johnson and Congress led to his im-

peachment, but his trial resulted in acquittal. Conditions in the South were deplorable, since the war had been carried on almost wholly within their borders. The plantations had been neglected, the railroads destroyed and many towns and cities had been burned; moreover the social system had been shattered and 4,000,000 negroes had been set free and were without homes or means of support. The government organized the Freedmen's Bureau to assist the negroes, and many organizations in the North also lent their assistance (See FREEDMEN'S BUREAU). The election of 1868 placed Gen. U. S. Grant in the presidential chair, with Schuyler Colfax as vice-president. During this year Arkansas, Alabama, North and South Carolina, Georgia and Louisiana were readmitted to the Union. The Fourteenth and Fifteenth amendments to the Constitution granting suffrage to the negro were passed before Grant's inauguration. During Grant's first term the Treaty of Washington was signed, and the Geneva Arbitration of the Alabama Claims occurred (See ALABAMA CLAIMS). The first Pacific Railroad was completed. Its construction had given rise to the Crédit Mobilier scandal (See CREDIT MOBILIER). The chief events of Grant's second term were the Whisky Ring frauds, the rise of the Granger movement, the financial panic of 1873, the passage of the coinage act in the same year, and holding the Centennial Exposition at Philadelphia to commemorate the first century of our existence as an independent nation. The election of 1876 was very close, and was decided by a special electoral commission, which gave Hayes, the Republican candidate, a majority of one electoral vote (See ELECTORAL COMMISSION). President Hayes adopted a more conciliatory policy towards the South and withdrew all troops still remaining in those states. Specie payments were resumed in 1879 (See SPECIE PAYMENTS, RESUMPTION OF). James A. Garfield, the Republican candidate, was elected in 1880, with Chester A. Arthur vice-

president. Serious differences developed within the Republican Party on the distribution of patronage. Garfield was shot early in the summer of 1881 and died the following September. Arthur then completed the administration, during which the Pendleton Civil Service Act was passed (See CIVIL SERVICE). In 1884 the Democrats won the election for the first time since 1856, and Grover Cleveland became president. The civil service was strengthened and extended. In 1888 the Republicans elected Benjamin Harrison and returned to power. In 1890 the McKinley Tariff Bill was passed. In 1892 Cleveland was again successful. During his second term the tariff was reduced. The Columbian Exposition was held in Chicago, a railway strike of national scope occurred, and in 1893 there was a widespread financial panic, which prostrated business for a number of years.

The chief issue in the campaign of 1896 was the standard for coinage. The business depression had resulted in a demand by a large number of people for a larger volume of money in the country. The Democrats advocated this policy and nominated William Jennings Bryan on a platform whose chief plank was the free coinage of silver on the basis of 16 to 1, that is, making 16 ounces of silver equal in value when coined, to one ounce of gold. The Republicans nominated William McKinley and advocated the gold standard. McKinley was elected by an overwhelming majority.

EXPANSION. After the election of 1896 business took a new start and all lines of industry revived rapidly. A new tariff bill increased the duties on many imported articles and an important act for establishing a monetary system was passed. The most important event of this administration, however, was the war with Spain, which freed Cuba from Spanish rule and in 1898, added Guam, Porto Rico, and the Philippines to the possession of the United States (See SPANISH-AMERICAN WAR). In 1900 the Hawaiian Islands, annexed

in 1898, became a territory of the United States, and in 1900 American Samoa came into our possession. One of the great results of the war was to place the United States in a position of increased importance and to give it greater prestige among the nations of the world. The nation has ever since been regarded as one of the great powers.

In 1900 McKinley and Bryan were again the candidates of their respective parties; Theodore Roosevelt was the Republican candidate for vice-president. The occupation of the Philippines had led to a serious rebellion in these islands. By the opponents, the government's policy towards the islands was termed imperialistic. There were many who believed that the United States should return the islands to Spain, or at least retire and leave them to the natives; hence imperialism became the leading issue of the campaign. McKinley and Roosevelt were elected by a large majority. In the summer of 1901 McKinley was shot while attending the Pan-American Exposition at Buffalo, and he died on Sept. 14. Roosevelt proceeded to carry out the policy of his predecessor. The leading events of this presidential term were the passage of the Chinese Exclusion Bill, establishing civil government in the Philippines, the passage of an anti-trust law, ratification of a treaty with Great Britain (See HAY-PAUNCEFOTE TREATY), creation of the department of commerce and labor, settlement of the anthracite coal strike, settlement of the Alaska boundary question with Canada, the passage of bills for reorganizing the army and militia and providing for an increase of the navy, the beginning under government control of extensive irrigation projects (See IRRIGATION) and the recognition of the independence of Panama. See PANAMA, REPUBLIC OF.

In 1904 Roosevelt was elected by the largest popular majority and the largest electoral vote that had been thus far given to any candidate. The chief events of his second term were the enactment of the pure food law, the beginning of

the Panama Canal (See PANAMA CANAL), the successful prosecution of corporations for violation of Federal Laws, the Portsmouth Peace Treaty, the Conservation Movement, and the panic of 1907. W. H. Taft, the Republican candidate, was elected in 1908, defeating W. J. Bryan, who was again the Democratic nominee. The Payne-Aldrich Tariff Bill of 1909 proved unpopular, causing the Republicans to lose control of the House of Representatives in 1910. Important events of Taft's administration, were discovery of the North and South Poles, establishment of postal savings banks and the parcels post, and admission of Arizona and New Mexico as states. The election of 1912 was marked by a split in the Republican Party; the regular Republicans renominated Taft and Sherman, while the progressives formed a new party, the National Progressive, and nominated Theodore Roosevelt and Hiram Johnson. The Democratic candidates, Woodrow Wilson and Thomas R. Marshall were elected, and the Democrats secured control of both Houses of Congress. The chief events of Wilson's first administration were the passage of the Underwood-Simmons Tariff Bill, with an Income Tax provision, the Panama Canal Tolls Bill, establishment of the Federal Reserve Banks, and the Tariff Commission, the Federal Farm Loan Act, the Villa Raid on Columbus, New Mexico, the Punitive Expedition of the United States Army into Mexico, and the German Submarine controversy. In 1916, Wilson and Marshall were renominated by acclamation and re-elected, defeating the Republican candidates, Charles E. Hughes and C. W. Fairbanks, by a vote of 277 to 254.

THE WORLD WAR. For more than two years the United States had not been involved in the World War, but the time was at hand when we could no longer remain neutral in the conflict. A special session of Congress was called immediately after the inauguration of 1917, and April 6, it passed a declaration of war with Germany, voted a war loan of

UNITED STATES

\$7,000,000,000, enacted a universal service law, and all the resources of our country were mobilized for war. See **WORLD WAR IN STUDY GUIDES**.

Immediately after the war, the United States faced the problems involved in a return to a peace basis. Our national debt had grown from one to twenty-four billion dollars. The largest army ever raised by our country had to be demobilized, and the soldiers returned to industrial life; but even more than all that, the changes in the world had been so great, nations old in history had been overthrown, new nations had arisen, the political life of many people had been so changed that the entire civilized world was living a feverish life of political un-

UNITED STATES, GREAT SEAL OF

ture population exceeded 100,000,000. The average population per square mile in continental United States had increased from 4.5 in 1790 to 35.5 in 1920. The circulation of money per capita in 1800 was \$5; in 1918 it was \$50.86; in 1849 the value of farm products was \$1,-299,000,000; in 1919 it was \$21,426,000,-000; in 1800 the imports amounted to \$91,252,768 and the exports to \$70,971,-780. In 1918 the imports amounted to \$2,946,059,403 and the exports to \$5,-928,285,641. The value of the manufactures in 1800 was \$1,019,107,000; in 1914 it exceeded \$24,246,323,000. While these comparisons give some idea of the material prosperity of the country, the American people have made even greater progress along the lines of education,



GREAT SEAL OF UNITED STATES

certainty, and we could not wholly escape the contagion of the times. In the campaign of 1920, the Republican party elected their candidates,—Warren G. Harding and Calvin Coolidge—and the Congress that met in special session in 1921 had to consider questions directly connected with changed conditions in Europe. President Harding died on August 2, 1923 in San Francisco, on his way home from a trip to Alaska, and Calvin Coolidge succeeded him as president.

In 1790 the United States had an area of less than 1,000,000 sq. m. and a population of less than 4,000,000. In 1920 her area, including outlying possessions, was over 3,700,000 sq. m. and her en-

general culture and moral refinement. The public schools are of the best among enlightened nations, and the great universities have attained international reputation, while in invention and discovery the Americans lead the great nations of Europe.

United States, Great Seal of. The day that the Thirteen Colonies of Great Britain declared themselves independent states, Benjamin Franklin, John Adams and Thomas Jefferson were appointed a committee "to prepare a device for a great seal for the United States of America." This committee reported in 60 days, but the recommendations it made were not adopted and much legis-

lation followed on the subject. In 1782 a seal was adopted which was satisfactory to the leaders in the Congress. This device was succeeded by another in 1885, which is here illustrated. The olive branch and arrows denote the power of peace and war exclusively vested in Congress, which body is typified in the eagle. The escutcheon is borne on the breast of the eagle without any other supporters to denote that the United States ought to rely on its own virtue. The constellation denotes a new state taking its place and rank among the others in the Union. The pyramid on the reverse side signifies strength and duration. The eye over it and the motto refer to interpositions of Providence in favor of the American cause. The date is 1776 and the words under it signify the beginning of a new era.

The Great Seal is in the custody of the secretary of state, by whose authority it is impressed upon executive papers. All modern nations have great seals which appear on all diplomatic papers. The states of the Union have seals, although their use in some of them is not obligatory; the substitution permitted is a pen and ink scroll with the letters L. S. (*locus sigilli*, the place of the Seal).

United States Indian Training and Industrial School, at Carlisle, Pa. (1879). This had its beginning partly in work done by the American Missionary Association and partly in the work of a school established by the women of St. Augustine, Fla., in 1875, for Indian prisoners at Ft. Marion. The Indians did so well in this school and some of them afterwards did so well at Hampton Institute, in 1878, that many others have since been enrolled at Hampton, where the association of Indians and negroes has stimulated both to greater efforts for themselves and their people. When the Indians came to understand the value of an industrial education, so many were found to be interested that in 1879 the abandoned army post at Carlisle was converted into a school for them. This school aims to fit its stu-

dents for earning a livelihood under the conditions of today, and for active participation in all those labors which should command the attention of good citizens. It enrolls some 1200 students, a larger number than any other Indian school in the country.

United States Steel Corporation, a corporation reorganized in 1907 by combining the Carnegie Company, the National Steel Company, the American Steel and Wire Company, the National Tube Company, the American Tin Plate Company, the American Bridge Company, the American Steel Hoop Company and a number of smaller concerns. At the time of organization the company had 1,404,000,000 capital. Besides the large steel plants under its control, it holds large interests in iron and coal mines, and owns lines of steamers on the Great Lakes and several lines of railway in the iron and coal regions.

U'niver'salists, those members of the Christian body who believe in universal salvation, or the doctrine that it is the purpose of God to bring, finally, all souls into reconciliation with Him. Universalists trace their faith back to the Fathers of the early Church. The first Universalist organization was founded in 1750 in London. The doctrine of Universalism was early preached in America, and on Jan. 1, 1779, a number of persons united in Gloucester, Mass., for the defense and promulgation of the Universalist faith. This was the beginning of the Universalist Church in America, which now reports about 550 clergymen, 600 churches, and 85,000 communicants. At the present time there are few churches in Europe definitely organized as Universalist, but the doctrine of universal salvation is accepted by many members of other churches, especially by the Unitarians.

U'niverse, the term by which we designate creation in its widest extent, including all suns with their attendant planets and the moons that attend the planets, all stars, star clusters, nebulae, or star clouds, asteroids and comets. The question as to whether or not the

universe is without bounds can, perhaps, never be positively answered; but the tendency of the day is toward the conclusion that the universe is limited; at least that there is a limit to the number of stars in that universe to which our stars belong. This conclusion is based upon the fact that fewer stars occupy a given unit of space as we recede from a given center. The solar system seems to be on the outer side of a great star cluster, the universe; the center of this universe would seem to be toward the Milky Way, where the stars are thickest. Whether or not there are other star clusters far beyond the farthest star of this cluster is not known.

Universities, schools of higher learning organized for original research and empowered to grant degrees. Universities, in the modern sense, date their origin from the early part of the twelfth century. They grew out of the old cathedral and monastic schools (See EDUCATION). In the beginning theology was the chief interest, but gradually an interest in science developed. The universities organized largely upon the models of the trade guilds and consequently divorced themselves from church and state and became self-governing, as they have remained in Europe. Among the early universities were Salerno (ninth century), Bologna (1158), Paris (twelfth century), Oxford and Cambridge (twelfth century), Prague (1387), Toulouse (1230), Heidelberg (1385), Leipzig (1409), Glasgow (1451), and Copenhagen (1477). By 1400 there were 36 universities; by 1500 there were 80, and by 1600 there were 108.

ENGLAND. The universities of Oxford and Cambridge have trained most of the leaders in all lines of thought in England (See CAMBRIDGE, UNIVERSITY OF; OXFORD, UNIVERSITY OF). In the latter part of the nineteenth century a new type of university appeared, the municipal or civic university. They were first established as local industrial schools providing for specific local needs, such as Sheffield with its iron and steel industries and Liverpool with its marine commerce.

Others of similar origin include Manchester, Leeds, Bristol, and Birmingham. Gradually they enlarged their functions, received government grants and recognition and now are full-fledged universities. Not only the industrial classes, but many of the wealthier classes attend because they can receive more modern training than at conservative Oxford and Cambridge.

FRENCH UNIVERSITIES. The University of Paris has been the model for all French universities. During the French Revolution all universities were abolished and for a time the older universities were compelled to suspend. When Napoleon assumed control, he organized the University of France, which was made the head of the educational system. The university had charge of all higher education. It was divided into 15 faculties located at as many educational centers throughout the country, with the central authority at the University of Paris. This arrangement continued until 1896, when the district universities were given the management of their own affairs under the minister of education.

GERMANY. The universities of Germany have long been centers of scientific research. There are more than 20 and each is renowned in one or more lines. Their organization is very different from that of American universities. They are primarily research institutions and so recitations, attendance checking, grading of students, etc., are entirely lacking. Professors give lectures when they please, upon whatever topics they wish, and students elect such lectures as they please, attend when they please, and are not required to take any examinations unless they wish to secure a degree. All lawyers, doctors, ministers, and the higher grades of teachers are university trained. The universities have no presidents and no boards of trustees. The faculties annually elect one of their members as chancellor and they select new members of the staff and determine all policies.

AMERICAN UNIVERSITIES. American universities may be divided into four

classes, which, taken in the order of their origin, are as follows: first, those which have developed from colleges, as Harvard, Yale and Princeton; second, those established by state Legislatures and known as state universities, as the University of California and the universities of Michigan and Wisconsin; third, those established by bequests, such as Cornell, Johns Hopkins, and Stanford universities; fourth, those founded by religious denominations, such as Syracuse University, the Catholic University at Washington and the University of Chicago.

Classified with reference to their pedagogic character, American universities may be roughly grouped under two general heads: (1) Universities equipped for the prosecution of original investigation and research in the various departments of study, besides usually having connected with them the various professional schools; and (2) universities, so called, that perform chiefly the preparatory work with more or less prescribed courses leading to the degree of B.A. or, in some cases, to that of B.Sc., B.Litt., or B.Ph.

CANADA. The leading universities of Canada are McGill, Queen's, Laval, Acadia, Dalhousie, and the provincial universities, Toronto, Alberta, British Columbia, Manitoba, New Brunswick, and Saskatchewan. See CANADA, subhead *Education*.

University Extension, the extension of university courses to persons who do not reside in the vicinity of such an institution, or for other reasons find it impossible to attend the regular sessions of its various departments. Under this plan one or more representatives of the university meet regularly, at convenient centers, those who desire instruction in such subjects as can be taught without laboratory facilities. An organization of interested persons is first effected; the line of work to be pursued is then agreed upon, and membership fees sufficient to cover all expenses are collected, or specifically pledged, on the basis of information furnished by that institution from which the instructor is to be secured. The instructor lectures usually once each week upon different phases of the subject selected, makes clear the written or printed outlines furnished by him, calls special attention to the more important points treated by those authors whose books are included among the 50 or 100 volumes in the reference library provided, encourages the free discussion of topics which bear directly or indirectly upon the course and, if it is desired, conducts quizzes and other tests by which those who wish may try for whatever university credit is specified

for this particular course. Extension courses, because they give opportunity for free discussion and for questioning of an expert, face to face, are of special value to those who are pursuing correspondence courses on closely related subjects.

The idea of extending university training in this manner to those hitherto denied the advantages of higher education, was evolved in England in 1872, and spread into France, Belgium, Austria, Denmark, Scandinavia, Russia, Australia and Canada. In 1887 the subject was presented at the meeting of the American Library Association and immediately taken up by the librarians of the larger cities, such as Buffalo, Chicago and St. Louis. The State of New York, Cornell University and the universities of Pennsylvania, Wisconsin and Chicago have been especially active in thus bringing the advantages of higher education to a large and steadily-growing constituency; while Harvard, Yale, Columbia, through its Teachers' College, and many other institutions are perhaps equally successful in this field. See SCHOOLS, CORRESPONDENCE; UNIVERSITIES; LIBRARY.

U'pas, a tall tree of the Nettle Family and native in Java. It is noted chiefly because of the many legends concerning its poisonous qualities, which make the Japanese unwilling to dwell or even to pass near the upas groves. Criminals who were sent to collect the bark seldom returned, and were supposed to have died from breathing its deadly exhalations. These tales are found to have little foundation in fact, although the effect of handling the bark is unpleasant and irritating. The upas tree branches about 60 ft. above the ground, bears long, oval leaves, inconspicuous flowers and black berries. The juices, mixed with capsicum, are used to anoint arrowheads and render them poisonous. The fiber is employed in making a coarse cloth.

U'ral, a river of eastern Russia. Rising on the southern slope of the Ural Mountains, in the Government of Orenburg, it flows south and west in a course of about 1400 m. and falls into the Caspian Sea. The tributaries are few, due to the limited rainfall over its basin, and the shallow waters of the river make navigation almost impossible. On its banks are the towns of Orsk, Orenburg, Uralsk and Guriev. Near its mouth the Ural Cossacks have extensive fisheries.

Ural Mountains, a mountain range forming a physical boundary between Europe and Asia and extending a distance of 2000 m. They fall abruptly on the eastern side, but on the western descend in broad, flat terraces to the European lowlands. The average elevation is scarcely more than 1500 ft.; Mt. Tel-pos is 5433 ft. above sea level. The range forms a watershed for the Volga and Petchora on the west, the Ural on the south and the Obi on the east. Large forests of spruce, firs and larch cover the central part. The mineral deposits are very abundant. About 1,500,000 tons of iron ore are produced annually, and gold, platinum, osmium and iridium are also abundantly mined, while precious stones, mercury, nickel, copper, zinc, cobalt and silver are found in smaller quantities. Due to this large mineral supply, important industries and popular towns have sprung up among the mountains.

Ura'nium, discovered in the mineral pitchblende, in 1789, and named after the planet Uranus, which had been discovered two years previously. It is a hard, white, lustrous metal, one oxide of which is used in making jet-black glass, and another in giving glass a yellow-green color. Uranium, like radium, has the property of radiating rays which have chemical effect upon photographic plates and have the power of discharging a charged electroscope; hence it is said to be radioactive. Its compounds are also radioactive in proportion to the amount of uranium which they contain.

It is believed that uranium has also the property of changing or disintegrating into other elements, among which are radium, actinium and polonium; but its rate of disintegration is very slow.

U'ranus, the planet of the solar system seventh outward from the sun. Its mean distance from the sun is 1,782,000,000 m.; its diameter 31,900 m., or a little more than four times that of the earth; its size about 74 times that of the earth, but its mass only about $12\frac{1}{2}$ times that of the earth. Its day is not certainly known, but is supposed to be nine or ten hours. Its year is 84 of our years. It

speeds along its way around the sun at the rate of 252 m. per minute. Uranus has four satellites, or moons, discovered by Herschel, who at first thought there were six. Herschel also discovered the planet itself while he was mapping stars in 1781. Uranus shines with a pale green light, and is seldom seen except through the telescope. See SOLAR SYSTEM.

Ur'ban, the name of eight popes. Urban I, Saint, was pope from 222 to 230. His pontificate was during the reign of Emperor Alexander Severus and had but little external opposition. It was disturbed, however, by a schism within the Church. Urban II was pope from 1088 to 1099. He prosecuted the struggle of the Papacy with Henry IV and brought it to a successful issue. He presided at the Council of Clermont, which gave an impetus to the First Crusade. Urban VIII, pope from 1623 to 1644, was the founder of the College of the Propaganda. He canonized Loyola and caused the erection of important public works in Rome.

Urban'a, Ill., an agricultural and educational center, the county seat of Champaign County, and the twin city of Champaign, 80 miles northeast of Springfield, on the Big Four and the Wabash railroads. It is the seat of the University of Illinois (See ILLINOIS, UNIVERSITY OF). Other institutions include the Eastern Illinois Sanitarium, a community enterprise, the Cunningham Orphanage, Wesley Foundation, the Methodist students' center, and the Outlook Tuberculosis Sanitarium. Among the city's pleasure grounds are Crystal Lake Park and the Outdoor Swimming Pool. Urbana has a large trade in farm products, and has car shops of the Big Four, manufactories of athletic equipment, machine-shop products, and lumber, and seed-culture laboratories. Urbana was settled in 1824, incorporated in 1833, and chartered in 1860. Population, 11,500.

Urine, *U'rin*, a waste fluid separated from the blood by the kidneys. It is clear, transparent and the color of am-

ber. In the healthy individual it contains urea, salt, uric acid and a small amount of hippuric acid; and is 40 parts solid to 960 parts of water. The normal adult discharges about two and one-half pints daily, but the amount is subject to wide variation. The amount is increased with large quantities of drinking water and by exposure to cold temperatures and by exercise, and is diminished by excessive perspiration. See KIDNEYS.

Ur'sula, Saint, a virgin martyr of the Roman calendar, honored particularly at Cologne, the reputed place of her martyrdom. According to the legend, which can be traced to the end of the 11th century, she was the daughter of a King of Britain and possessed rare beauty. Though betrothed, she set out on a three years' pious pilgrimage in company with 11,000 maidens, collected from all parts of the world. Landing at Cologne, they were there put to death by a band of Hunnish invaders. Another version of this legend makes Ursula's companions to have numbered but 11.

Ur'sulines, a sisterhood in the Roman Catholic Church, founded by St. Angela Merici in 1535. They are sometimes called the Nuns of St. Ursula. A branch was established in Quebec in 1639, and they are now found throughout Europe and America. The order has over 7000 members and 300 convents. Their special work is in educating children and relieving the poor.

Uruguay, *U' roo gway*, the smallest of the republics of South America. It is bounded on the n. by Brazil, on the e. by Brazil and the Atlantic Ocean, on the s. by the Atlantic Ocean and the Rio de la Plata and on the w. by the Uruguay River. The total area, including the small islands lying along the coast and in the Rio de la Plata, is approximately 72,000 sq. m.

SURFACE AND CLIMATE. The northwestern part is elevated and the ridges rise here and there to a height of about 2000 ft. The table-lands along the Uruguay River resemble the pampas of

Argentina; in the southeast are low and marshy plains, and the low ridges gradually slope down to sandy stretches bordering the ocean. The important rivers are the Uruguay, Rio de la Plata and the Rio Negro. The climate is pleasant, due to the partly peninsular position of the country, and the average range of temperature is from 32° to 88° F. In the uplands frosts and snows sometimes occur and there are frequent winter storms.

AGRICULTURE AND MINING. Agriculture is gradually growing in importance, but the grazing industries are still the principal support of the inhabitants. The ranches cover over 35,000,000 acres, the pasture lands about 38,000,000 acres, and the cultivated area over 2,000,000. The principal crops are wheat, maize, millet, barley, flax, rye and oats. Wine is produced and olives and tobacco are grown. Flour represents the chief manufacture. The mineral wealth is fairly abundant, but has so far been only slightly exploited. Gold mines are worked in the northern part, and silver, iron, copper, magnesium, lead, zinc, sulphur, coal and antimony are thought to exist. The marble and other building-stone quarries yield a fairly rich output.

TRANSPORTATION AND COMMERCE. The rivers are navigable and are largely used for transportation purposes. In addition to the national highways and departmental roads are about 1300 m. of railways. Steamship service is maintained and Montevideo is the principal port. The exports are hides, preserved meat, beef extracts, tallow, horns, cattle and agricultural products; the imports include ironware, foodstuffs, machinery, textiles and jute.

GOVERNMENT. The government of the republic is based on the constitution of 1830. A Senate and a Chamber of Deputies constitute the legislative department. One member from each of the 19 departments constitutes the Senate, and the Chamber is made up of 69 deputies, or one out of every 3000 voters. The president exercises the executive power and is assisted by a vice-

president (who is also the presiding officer of the Senate) and a cabinet. His term is for four years and he is chosen by a majority vote of the Assembly at a joint session. The president appoints an executive to rule over each territorial department, who is assisted by an administrative council chosen by popular election. The judicial power is in the hands of six national Courts of Appeal. The capital of the country is Montevideo.

INHABITANTS. The natives are largely of mixed birth and are characteristically conservative. In the north is a large Brazilian element. The foreigners, approaching 92,000 in numbers, come principally from Spain, France, Argentina, Brazil and Italy.

EDUCATION AND RELIGION. Public elementary schools are maintained by the government, but in spite of the compulsory education law only about eight per cent of the population represents the school attendance. There is a military school, a museum, a library, an industrial school, a school of art and numerous private schools. The University of Uruguay is at Montevideo. The Roman Catholic Church is the State religion, but other sects are freely tolerated.

HISTORY. After being disputed for by Spain and by Portugal, Uruguay fell to Spain, forming part of Buenos Aires. Montevideo escaped from Spanish control in 1814, but Uruguay did not win independence till 1828, when a distinct nation was formed. The constitution was adopted in 1830. Years of internal dissension and revolutions almost ruined the country; but since the beginning of the 20th century its prosperity has been remarkable. Montevideo, the capital and chief city, is described under its title. The population, numbering about 1,000,000, consists largely of a people combining Indian, Spanish and Portuguese blood. The Spanish tongue prevails.

Uruguay River, a South American river rising on the western slopes of the Serra do Mar Mountains of southern Brazil and flowing east and then south until it enters the broad estuary of the

Plata (Rio de la Plata). For about 400 m. of its course it forms the boundary between Uruguay and Argentina. It receives many tributaries, chief among which is the Rio Negro. The Paraná and the Uruguay together form the broad stream known as the Plata. From its mouth to the city of Fray Bentos, a distance of about 75 m., the river is from 6 to 9 m. in width. Its total length is 950 m., and it is navigable to the cataract of Salto Chico, about 200 m. Above this cataract the river is again navigable to smaller boats.

U'tah, THE BEE HIVE STATE, one of the Mountain States, is bounded on the n. by Idaho and Wyoming, on the e. by Wyoming and Colorado, on the s. by Arizona and on the w. by Nevada.

SIZE. The length from north to south is 350 m., the breadth is 280 m. and the area 84,990 sq. m., of which 2806 sq. m. are water. Utah is almost the exact size of Minnesota and a little larger than Idaho. It is twice the size of Virginia, about the size of Kansas and Delaware combined and the tenth state in area.

POPULATION. In 1920 the population was 449,396. From 1910 to 1920 there was a gain in population of 76,045, or 20.4 per cent. There are 5.5 inhabitants to the square mile and the state's rank in population is 40.

SURFACE. The Wasatch Mountains cross the state from north to south a little east of the median line and constitute its most prominent physical feature. That portion of the state west of the mountains is a part of the Great Basin. The surface is that of a rolling plateau from which minor mountain ranges rise, and is, in large part, nearly barren of vegetation other than sagebrush, greasewood, etc. The lowest point of this plateau is Great Salt Lake, whose altitude is 4210 ft. In the northeastern part of the state are the Uinta Mountains extending east and west and having a number of peaks exceeding 10,000 ft. South of the central part of the state there are also a number of high peaks, some belonging to the Wasatch Range and oth-

ers standing alone. East of the Wasatch Range is the Valley of the Colorado. Southern Utah possesses four natural bridges of great size and grandeur. See NATURAL BRIDGE.

RIVERS AND LAKES. The eastern part of the state is drained by the Colorado, which is formed by the Green and the Grand. The Green and the Colorado receive a number of small streams within the state, the most important being the Uinta, the Price, the Fremont and the San Rafael, while the Virgin enters the Colorado in Nevada. Nearly all the western portion of the state is drained into the lakes of the Great Basin. The Sevier River flowing into a lake of the same name is the largest stream. The Jordan River drains Utah Lake into Great Salt Lake.

The lakes are found in the Great Basin. The largest is Great Salt Lake, which has an extent from north to south of 75 m. (See GREAT SALT LAKE). Sevier Lake in the southern part is the next in size, and the third is Utah Lake, a little south of Great Salt Lake.

CLIMATE. Utah has a dry climate, and in summer the heat in places may reach 100°, but the rarity of the atmosphere modifies this extreme temperature. The mean annual temperature for the northern part of the state is 48° and for the southern part 51°. The rainfall for the entire state is about 16 inches, but it is much less than this average in some localities. Heavy snows occur among the mountains and they constitute the chief source of water supply.

MINERALS AND MINING. Large deposits of gold, silver, copper, lead and iron occur in the mountains, and mining is an important industry. The annual value of the total mineral output is about \$100,000,000. Copper and lead are the most valuable, followed by silver and gold. There are large smelters for copper ore at Garfield and Bingham, and lead works are located at Murray, Midway, Tooele and Silver City. There are also concentrating mills at Garfield, capable of handling as much as 8500 tons of ore a day.

Utah has about 20,000 sq. m. of bituminous coal land, and the annual output is about 3,000,000 tons. Of this amount, more than nine-tenths is mined within Carbon County. Other coal-producing counties are Summit, Emery, San Pete and Uinta. Much coke is manufactured. Petroleum has been found in several places. Clay suitable for brick and tile is widely distributed, building stone is abundant and large quantities of salt are taken from the basin of Great Salt Lake.

FORESTS AND LUMBER. Nearly all of the timber areas of Utah are included within her national forests, located chiefly along the Wasatch and Uinta mountains and spurs. It is estimated that these forests contain 8,779,500,000 board feet of lumber, valued at \$19,000,000. Lumbering is an important industry and the annual cut amounts to about \$18,000,000.

AGRICULTURE. Agriculture is the leading industry of the state and two methods of cultivation are in general use. These are dry-farming and irrigation. The state contains 22,000,000 acres of land suited to farming, much of which is not yet under cultivation. Wherever the soil is free from alkali and sufficient moisture can be obtained abundant crops are raised.

Products. The chief field crops in the order of value are hay, wheat, sugar beets, potatoes, corn, oats, barley, alfalfa seed and rye. The irrigated lands are suited to raising fruit and vegetables; large quantities of apples, peaches, pears, cherries, apricots, plums and prunes are raised. The leading fruit districts are found in Utah, Boxelder, Grand and Weber counties. Garden vegetables are also raised in large quantities.

Raising live stock is an important branch of agriculture. Utah is one of the leading states in raising sheep and the annual wool clip is about 20,000,000 lb. Horses and cattle are raised for the market and furnish a valuable source of income. The dairy interests are also valuable and of increasing importance

Utah is the pioneer state in irrigation, which was begun by the Mormons when they settled Salt Lake Valley in 1847. This valley and all the surrounding region was at that time a barren desert, but by the application of water taken from the mountain streams the settled portions were soon transformed into fertile fields. The system thus begun has been continually extended and the state now has over 8000 m. of irrigating canals and has reclaimed nearly 5,000,000 acres of land.

MANUFACTURES. The leading manufacturing industries are slaughtering and meat packing, the manufacture of beet sugar and flour and gristmill products, the construction and repairing of railroad cars and locomotives, drying and canning fruits, making butter and cheese, and the manufacture of boots and shoes and of salt.

TRANSPORTATION AND COMMERCE. The Union and Southern Pacific together extend across the northern part of the state from east to west. The Denver & Rio Grande enters the state from Colorado about midway between its northern and southern boundaries and extends in a northwestern direction to Salt Lake City and Ogden. The San Pedro, Los Angeles & Salt Lake road extends to Los Angeles in a southwesterly direction from Salt Lake City. The Western Pacific extends from Salt Lake City westward across the state to San Francisco, and the Oregon Short Line northward from Salt Lake City. There are also a number of short lines connecting mining towns with the principal cities. Ogden and Salt Lake City are the chief railway centers.

The state has considerable local commerce and exports gold, silver, copper, lead, coal, wool, live stock, sugar, flour, wheat and other agricultural products.

GOVERNMENT. The constitution was adopted in 1895. The executive department consists of a governor, secretary of state, auditor, treasurer, attorney-general and superintendent of public instruction, elected for four years. The Legislature consists of a Senate whose membership

cannot exceed 30 and a House of Representatives whose members cannot exceed three times nor fall below twice the number of senators. The senators are elected for four years and the representatives for two. The judicial department comprises a Supreme Court of three judges elected for six years and District Courts in each of the seven judicial districts into which the state is divided. Judges of the District Courts are elected for four years and there may be from one to four in each district.

EDUCATION. A uniform system of public schools is maintained throughout the state and is under the general direction of a state superintendent of public instruction. High schools are maintained in the cities and large towns. There is a state university at Salt Lake City which maintains a normal department. The state agricultural college is at Logan. There are also a number of institutions under the auspices of the Mormon Church and other denominations.

STATE INSTITUTIONS. The hospital for the insane is at Provo City, the state penitentiary is at Salt Lake City and the state reform school at Ogden.

CITIES. The chief cities are Salt Lake City, the capital; Ogden, Provo City and Logan.

HISTORY. Utah (an Indian word which means "home on a mountain top") was visited by members of a Coronado expedition in 1540. It was traveled by Franciscan friars in 1776, who were looking for a trail from Santa Fe to Monterey, California. In 1825 James Bridger, a trapper, found Great Salt Lake, and in 1847, approximately 1650 Mormons entered Utah. The land came into the possession of the United States through the Mexican cession of 1848, and in 1850 it was organized a territory, which included parts of Nevada, Colorado and Wyoming. Because of differences with the Federal Government, United States troops took possession of Salt Lake City and the surrounding settlements, June, 1858, but the differences were soon settled.

Polygamy was prohibited by act of Congress in 1862, but the law was not enforced. In 1882 a more strenuous law was passed, and this was made still stronger in 1887. In 1890 the Mormon Church announced that it would no longer countenance plural marriages. In 1894 a constitution satisfactory to Congress was adopted, and Utah became a state two years later.

GOVERNORS. Heber M. Wells, 1896-1905; John C. Cutler, 1905-1909; William Spry, 1909-1917; Simon Bamberger, 1917-1921; C. R. Mabey, 1921-25; George H. Dern, 1925—.

Utah Lake, a fresh-water lake in Utah about 30 m. s.e. of Great Salt Lake. It is about 25 m. long and 8 m. wide. It discharges into Great Salt Lake through the Jordan River.

Utah, University of, at Salt Lake City (1850). Established as the University of the State of Deseret, and re-incorporated in 1892 under its present title, this institution includes schools of arts and sciences, education, mines and engineering, law, medicine, commerce and finance. Its site of 92 acres was granted by Congress from the old Ft. Douglas Reservation. The present value of the university property is upwards of \$1,500,000. Its library is the largest in the state and contains some 75,000 volumes.

Ute, or **Utah**, a tribe of North American Indians. They were a brave and warlike people living in Utah, New Mexico and Colorado, where some 2000 are still found on reservations. They were friendly to the whites, and only one outbreak occurred, that of the White River Band, in 1879. They hunt and fish and are now engaged in industrial pursuits.

Utica, an ancient Phoenician city of northern Africa about 15 miles from Tunis, founded, according to tradition, about 1100 B. C. It was an important commercial center and was only partially eclipsed by Carthage itself. During the Punic Wars it was important and, through siding with Rome early in the third war, it was given a large

share of Carthaginian territory. It was the scene of the last stand of the Pompeians against Caesar and of the suicide of the younger Cato after Caesar's victory at Thapsus (46 B. C.). It became a free city under Caesar. The Arabs destroyed it toward the end of the seventh century.

Utica, N. Y., a manufacturing and distributing center and the county seat of Oneida County, 95 miles northwest of Albany on the Mohawk River and the New York State Barge Canal, and on the New York Central, the New York, Ontario & Western, the Delaware, Lackawanna & Western, and the West Shore railroads. It has a municipal airport. With the opening of the Barge Canal, the old Erie Canal fell into disuse, and in 1921 the city built a conduit for water and a roadway over the site of the canal, eliminating the old bridges on the main streets. Utica is attractively situated at an elevation of about 430 feet and has a public park system of 750 acres.

Utica's industries are diversified. It ranks first in the state in the manufacture of cotton cloth and knit goods, and manufactures one-third of all the knitted underwear made in the country. Other important manufactures are ventilating and heating apparatus, men's clothing, fire-fighting apparatus and equipment, metal beds and springs, knitting machinery, air compressors, sporting rifles and pistols, worsted and woolen cloth, corduroy, toys, suspenders, brass products, emblems, badges, tobacco, trunks, fishing rods and tackle, paper boxes, farm machinery, and iron and steel products. The Lewis machine gun, which played a conspicuous part in the World War, is manufactured here. Utica is in a rich dairy-farming country, and is known for its large output of cheese. Quantities of fruit, flowers, dairy products, and livestock are shipped.

Among the state institutions are the Utica State Hospital for the Insane, the Marcy Division of the Utica State Hospital, the New York State Masonic

Home, the New York State Soldiers' and Sailors' Memorial, and the state Masonic Hospital. There are a number of orphan asylums and several homes for the homeless and aged. Hamilton College is situated nine miles from the city.

Utica was settled on the site of Old Fort Schuyler in 1786 and was incorporated as a town under the name of Utica in 1798. A city charter was granted in 1832. Population, 104,200.

Utilitarianism (from Latin *utilitas*, useful), the ethical doctrine that makes the highest good consist in the greatest happiness of the greatest number. An act is good or bad according to the success or failure of its consequences in securing this end. The term was first used in a philosophical sense by John Stuart Mill, but the theory itself was older. It is the modern form of hedonism, and is distinguished from the ancient forms by the emphasis which it puts on collective happiness rather than that of the individual. In its later phases it has attached itself to the doctrine of evolution. Utilitarianism is especially influential in English thought, its chief representatives being Hume, Paley, Bentham, the two Mills, Leslie Stephen and Herbert Spencer. See HEDONISM; ETHICS.

Utopia, a political romance in Latin written by Sir Thomas More in 1516. It was translated in 1551 and in 1683. Utopia is the name of an imaginary island where there existed an ideal state of society. Many ideas of modern socialists are similar to those set forth in

this work. From the name is derived the term *Utopian*, which is frequently applied to any scheme which is considered visionary or impossible. See MORE, SIR THOMAS.

Utrecht, U'trekt, Treaty of, a number of separate treaties agreed upon at Utrecht by the powers which had been engaged in the War of the Spanish Succession, the American phase of which is called Queen Anne's War. In 1713, Portugal, Prussia and Savoy signed separate treaties with France. The Emperor refused to accede and the differences were adjusted in 1714 by the treaties of the Rastadt and Baden. By the treaty with England, France recognized the Hanoverian succession and agreed that the crowns of Spain and France should never be united in the same person, and ceded to Great Britain Nova Scotia, Newfoundland and Hudson Bay Territory. Gibraltar and the Island of Minorca were also ceded to England. The Dutch were given the right of garrisoning eight frontier towns in Austrian Netherlands as a barrier against any future aggressions on the part of France. The King of Prussia also received confirmation of his title. The Peace of Utrecht effected the most important political rearrangement in Europe between the Peace of Westphalia and the Congress of Vienna and opened the line of development which was to result in a united Germany and a united Italy in the 19th century. From Utrecht dates England's commercial and colonial growth. See SPANISH SUCCESSION, WAR OF THE.

V

VACCINATION, *Vak si na' shun*, the process of inoculating a person with cowpox to avoid or render less dangerous an attack of smallpox. To make the vaccine, a cow is inoculated with the germs of smallpox, and after the pustules are formed the virus contained in them is collected and dried upon ivory or quill points, known as vaccine points. These must be dried with care and hermetically sealed in tubes out of reach of any infection. When used a scratch is made through the skin of the patient, generally upon the arm, and the virus is injected. If it "takes," a swelling is noticeable and a few days later a soreness follows. This may be accompanied by dizziness, headaches and slight symptoms of smallpox. Finally a scab forms over the sore, which soon loosens and falls, leaving a slight scar. If vaccination is performed with sterilized instruments and with clean vaccine points, there is absolutely no danger and the prevention of smallpox is sure. A reliable physician should be secured to do the vaccinating. See SMALLPOX; SERUM THERAPY.

Vacuum, *Vak' u um*, a space containing no matter as we understand matter. By means of an air pump, the air in a vessel can be diminished until the vessel is very nearly free from ordinary matter; hence a nearly perfect vacuum is secured. Interstellar space is supposed to be a far more perfect vacuum than that produced by any artificial means. It is assumed, however, that all space is filled with a medium of some kind called the luminiferous ether, which we cannot detect as we do ordinary matter, but which serves to transmit the electromagnetic waves of light, heat and the wireless telegraph. See AIR PUMP; LIGHT; TELEGRAPH, WIRELESS.

Vacuum Cleaner, an apparatus for removing dust, especially from carpets,

rugs, curtains and furniture, by suction. It consists of some form of air pump or suction fan which is made to draw air through a nozzle at the end of a flexible rubber hose. The dust is carried away by the air current and separated from it, either by means of screens of muslin or other similar material, or by baffle plates, so arranged that the heavier particles fall to the bottom of a receptacle.

There are several types of vacuum cleaner. The first introduced was that having a gasoline engine mounted on a truck and driving an air-exhausting pump, which was carried around periodically to houses and office buildings where cleaning was desired. Later, stationary plants were installed in the basements of buildings and operated either by electric motors or gasoline engines. These are provided with a system of pipes supplying each floor with the means of cleaning. The last development of the vacuum cleaner is in a variety of forms of small, portable, self-contained machines, which are employed in cleaning houses and offices, and are displacing largely the broom and duster. These machines are generally operated by electrical power, supplied by the lighting current by connecting with the lamp socket. Some patterns are operated by hand or foot power. In operating a vacuum cleaner nozzles of different forms are provided in order to get into all corners and crevices where there is dust, and sometimes a hollow brush is attached to the nozzle so that the dust can be more easily dislodged.

Vacuum Pan, a closed vessel containing heating coils and used principally for boiling down cane juice and sirups in making sugars, candies and other commodities requiring low temperature for evaporation. The principle upon which the vacuum pan operates is that the boiling point of a liquid is lowered as the pressure upon its surface is reduced.

This is accomplished by producing a partial vacuum within the vessel by means of an air-exhausting pump, reducing the pressure from that of the atmosphere and lowering the boiling point correspondingly. When liquids are boiled at low temperatures in a vacuum pan, they are less likely to burn and scorch, and the process of evaporation is quickened. In making sugar from cane juice in the vacuum pan, there is but little sugar left in the molasses.

Valdai, *Val di'*, Hills, a range of hills forming a watershed in west-central Russia. The range extends between Leningrad and Moscow for a length of .250 m., and has a maximum altitude of 1000 ft. above sea level. The Dnieper, Volga and Düna have their sources in these hills. They were once heavily forested, but are now cleared and open to cultivation.

Valencia, *Va len' shi a*, a city of Spain, the capital of the Province of Valencia, situated 185 m. s.e. of Madrid, on the right bank of the Guadalaviar River. There are many traces in the city of its former Moorish occupancy, and the medieval buildings in the narrow, winding streets of the older part offer a picturesque appearance. The principal buildings include the prominent Cathedral La Seo, the Church of San Andrés, La Lonja (the silk exchange) and the Plaza de Toros, or bull ring, seating 17,000 spectators. The University of Valencia is one of the foremost educational institutions in Spain. The harbor on the Mediterranean is secure. Among the industries are silk spinning, hemp and linen weaving, and the making of velvet, felt, gloves, fans, iron and bronze ware, leather goods, tobacco and pottery. Valencia was known to history as early as 138 B.C.; in 714 it was captured by the Moors. Population, about 257,000.

Va'lens (328-378), Roman emperor in the East while Valentinian ruled in the West. He allowed the Goths, driven by the Huns, to cross the Danube and settle in the empire. Incensed at the deceit of officials, the Goths soon rose in rebellion, and Valens met them at Adrianople, where he was killed.

Val'entine, Saint, a martyr of the third century, about whom little is known. Tradition says that he cured the blind daughter of a certain Asterius, who, commissioned by the Emperor Claudius to win St. Valentine back to paganism, was himself converted to Christianity. Thereupon the Saint was imprisoned and finally beheaded. St. Valentine's Day, the 14th of February, is observed generally as a time of festivity and merriment, but no connection between the celebration and the story of Valentine can be traced. Instead, it is thought that the popular observance of St. Valentine's Day may be a survival of the ancient Roman festival of the Lupercalia, at which the names of young



VALKYRIE

women were placed in a box, while the young men drew them out according to chance. Such a custom prevailed in England and France for centuries, and is mentioned in the *Diary* of Pepys.

Valentin'ian I (321-375), an Emperor of Rome, successor of Jovian. He came to the throne in 364, shortly after his succession resigning the government of the East to his brother, Valens. During his reign the Alemanni, Saxons and other tribes invaded the empire, but these invasions were generally repelled. Valentinian proved a wise and tolerant ruler. He forbade persecution on account of religious beliefs, provided for free medical attendance for the poor of

Rome, and prohibited the holding of private judicial proceedings. During his reign schools were established throughout the empire. He was succeeded by his sons Gratianus and Valentinian II.

Valhal'la. See WALHALLA.

Valkyries, *Val kir' eez*, in Northern mythology, nine attendants of Odin, who chose half the dead heroes of the battlefield, conducting them, over the rainbow bridge, into Walhalla. Here, robed in white, they served the warriors mead and boar's flesh. The Valkyries typified the clouds.

Valladolid, *Vahl" yah tho leeth'*, a city in Spain, on the Pisuerga River, 100 m. n.w. of Madrid. The city has a number of buildings of historic interest. The most famous of these is the Church of Santa Maria la Antigua, said to have been founded in the 11th century. Other structures of interest are the museum which contains a valuable collection of sculpture and paintings, the house where Columbus died and the Colegio de San Gregorio, now used for municipal offices. The university, founded in 1346, has about 1400 students and is the leading educational institution. The academy of arts and sciences ranks next to the university. The city has a large plaza and a fine park. The leading industries include the manufacture of textiles, gloves, paper, pottery and foundry products. Valladolid was the old capital of Castile, and when that monarchy was combined with Aragon it remained the seat of government of the United Kingdom, until it was supplanted by Madrid. Population, about 80,000.

Vallejo, *Val la' ho*, Cal., principal city of Solano Co., about 25 m. n.e. of San Francisco, on the Napa River, an inlet of San Pablo Bay. A branch of the Southern Pacific Railway enters the city, while an electric line connects it with near-by points, and steamships with San Francisco. There is a good harbor, which has been improved by the Federal Government, and much shipping. The city is the outlet of Napa Valley, one of the foremost fruit sections of the state, and is also an important wheat market.

Its manufactories include flour mills, cement works, fish- and fruit-canning plants, lumber mills, dairies and tanneries. Opposite the city and half a mile distant from it is Mare Island, the headquarters of the Pacific Naval Squadron of the United States. It contains a navy yard, arsenal, dry docks and a lighthouse. The attractions of Vallejo are St. Vincent's Academy, a Carnegie library, the Good Templars' Home for orphans, the city hall and a sailors' clubhouse. Vallejo, for a time the capital of the state, was first chartered in 1866. Its present charter provides for the commission form of government. Population in 1920, 16,853; estimated, 1925, 26,641.

Val'ley, low land lying between mountains or hills and usually having a stream flowing through it. Valleys between mountains are formed by the folding of the layers of rock in the earth. Some of these valleys are of great length, like the great valley extending from Puget Sound to the Gulf of California. Valleys between mountains are usually narrow, with steep slopes, though at the lower end they may broaden and the slopes become more gradual. Cross valleys, or valleys across mountain ranges, are usually short, narrow and characterized by precipitous slopes. These valleys are often occupied by roads and railways and are called mountain passes. Such are the Tennessee Pass and the Marshall Pass in the Rocky Mountains. Some cross valleys are occupied by streams. Good examples of these are the Delaware Water Gap on the Delaware River and Crawford Notch in the White Mountains.

River valleys are formed by erosion. In their upper half, where the current is usually swift, the valley is narrow and the river banks are steep and often high. In the lower half, the valley usually broadens and the slopes become very gentle. Here the current of the river is slow and easily turned from its course by obstructions. In this part of the valley we have a meandering stream with numerous flood plains. The Mississippi Valley is a typical river valley. Deep river val-

leys with nearly perpendicular sides are known as canyons. Of this type the Grand Canyon of the Colorado is the most striking example in the world. See COLORADO, GRAND CANYON OF THE; RIVER; EROSION.

Valleyfield, a town of Canada, in the Province of Quebec, in Beauharnois Co., situated on Lake St. Francis, 25 m. s.w. of Montreal, and on the Grand Trunk and the New York Central & Hudson River railroads. It is a port of call for steamers between Montreal and Lake Ontario ports. The industries include dairying, stock raising and the manufacture of cotton (its cotton mills being the largest in Canada), flour, paper, stoves and bronze goods, furniture, gasoline engines and yachts. Population, 1921 census, 9,215.

Valley Forge, a village in Chester County, Pa., about 25 m. northwest of Philadelphia. It is famous as the scene of winter quarters of Washington's army, Dec. 17, 1777, to June 18, 1778. Because of gross mismanagement by a neglectful quartermaster and commissariat, the supplies furnished to the soldiers were inadequate. The latter part of December Washington notified Congress that 2898 of his men were unfit for service because they were "barefoot and otherwise naked." Yet, at the same time, barrels of clothing were rotting on the roads and in the woods because there was no one to haul them. Often strong men served as beasts of burden; nevertheless there were not blankets enough to sleep on nor was there sufficient straw for pallets on which to lie. The sufferings endured were indescribable and called forth pity and admiration. Altogether, the winter at Valley Forge was the darkest period in the Revolution, there being many times when, out of the 11,000 men in camp, not 2000 were in fighting condition. Washington stayed with his army the entire time and helped the situation with his encouragement. On breaking camp the troops went to Philadelphia.

Valparaiso, *Vahl' pah rah e' so*, a seaport of Chile, capital of the Province of

Valparaiso, situated on a bay on the Pacific Ocean and connected by rail with Santiago, 75 m. to the southeast. The city is built on the lower slopes of the barren hills that project to form a peninsula in the Pacific Ocean. It maintains a hydrographic bureau, and among its public institutions are the Museum of Natural History, a naval academy and several colleges. The harbor is large, and Valparaiso, preeminently a commercial city, carries on an extensive foreign trade, being connected by cable and regular steamship lines with Europe and the United States. The large industrial establishments are foundries, government railway shops, sugar refineries, bottling works, breweries and distilleries. Valparaiso was founded by Juan de Saavedra in 1536, and has suffered heavy losses from repeated earthquakes, the one of 1906 destroying a large part of the city. Population, about 183,000.

Valve, in mechanics, a movable lid operating within a tube or casing and generally on a surface called a seat, for the purpose of controlling the passage of fluids, whether in the form of gas, steam or water. Valves are variously constructed and differ in form by reason of the many purposes they are required to serve. Pumps are fitted with self-acting or check valves that close or open according to the movement of the water. Throttle and globe valves control the flow of steam or water by a hand wheel operating a screw which withdraws the lid from its seat to open, or screws it down tight to close.

A slide valve is a form of valve which opens and shuts the steam ports of an engine cylinder by moving over them in a parallel plane, and is operated automatically by an eccentric on the engine shaft, which gives a to-and-fro motion to the valve rod, on which the slide valve is attached. Piston valves are cylindrical in form, and work in a tubular orifice by the same means and for the same purpose as slide valves. Lift, or poppet, valves generally consist of a disk with a bevel edge, having for a seat a circular grid or disk, with openings, which operate by

their own weight or by means of springs or levers. They are employed chiefly on steam marine engines to govern the flow of steam to and from the cylinder. See ECCENTRIC; PUMP; SAFETY VALVE; STEAM ENGINE.

Vam'pire, a species of bat, whose name is so connected with legend and fable that its real habits are not easily known. The most common vampires are small red-colored bats with sharp teeth, with which they wound their victims. They fasten themselves upon the wound and suck the victim's blood, through a small gullet, into a modified stomach. Their victims are generally the wood animals of tropical America, where the vampires are found, but occasionally vampires attack people who are sleeping in unsheltered places, and draw quite a quantity of blood before awakening them. The home of the vampire is a cave or hollow tree, where it hangs suspended for long hours while the slow process of digestion goes on. In anatomy the vampires differ from the Northern bats in having large ears, keen eyes and large sensitive skin patches upon the face. See BAT.

Vana'dium, a metal somewhat resembling silver in appearance. It never occurs pure and is obtained from a few rare minerals, some common ores, and slag formed in making Bessemer steel. It is difficult to obtain the metal in a pure state because at a high temperature it readily combines with oxygen, forming oxides. Vanadium was discovered as an element in 1830 and first separated as a metal in 1867. The spectroscope shows that it is present in the sun.

Van Bu'ren, Martin (1782-1862), eighth president of the United States, born at Kinderhook, N. Y., and descended from the early Dutch settlers. After an apprenticeship of seven years in a country law office he went to New York City and studied law in the office of William P. Van Ness. He was admitted to the bar in 1803, and returned to his native town and began practice. In 1807 he married Hannah Hoes and removed to Hudson, the county seat of Columbia

County. He early became interested in politics, and served in a nominating convention at the age of 18. In 1812 he was elected to the State Senate, and from 1815 to 1819 served as attorney-general of the state. Meanwhile he had removed to Albany in 1816 and formed a law partnership there.

In 1821 he was elected to the United States Senate, where he served as chairman of the judiciary committee, opposed internal improvements by the Federal Government and became a strong advocate of states' rights. In 1828 he resigned from the Senate and became governor of New York. Van Buren was an enthusiastic supporter of Andrew Jackson for the presidency and became his secretary of state in 1829, but resigned two years later to become minister to England. The refusal of the Senate to confirm his appointment after he had sailed, only increased his popularity, and he was easily elected vice-president in 1832 for Jackson's second term.

In 1837 he became Jackson's successor as president of the United States. His administration witnessed the severe financial panic of 1837, and perhaps the most important measure adopted was the establishment of the independent treasury system of the Federal Government. During the Canadian rebellion in 1837 Van Buren insisted upon maintaining strict neutrality. These measures cost him popularity, and in the election of 1840 he and his party were overwhelmingly defeated by his Whig rival of four years before, Gen. William Henry Harrison. In 1848 he was the presidential candidate of the new Free-Soil Party, but only divided the votes of the Democrats and caused their defeat.

Van Buren was always an uncompromising foe of slavery, even when his party favored it. He was a man of broad and generous spirit, who had a wide circle of personal friends, including many of his political opponents. As a practical politician he had few equals, and was for many years the controlling spirit of the so-called Albany Regency, for the control of the Democratic Party; but he

used his great skill for what he regarded as the highest ends. He wrote *An Inquiry into the Origin and Cause of Political Parties in the United States*.

Vancouver, B. C., the fourth largest city and the most important Pacific port of Canada and the metropolis of British Columbia, situated on a peninsula of Burrard Inlet, an extension of the Strait of Georgia. It is about 85 miles by water north of Victoria and is the western terminus of the Canadian Pacific and the Canadian National railroads. The city's importance is largely derived from its harbor, one of the finest in the world and a port of call for 45 steamship lines. The harbor development includes the harbor of North Vancouver, on the north shore of Burrard Inlet, which is connected with Vancouver by bridge and ferry. Much of its shipping developed through the opening of the Panama Canal. The wheat of western Canada is shipped largely from Vancouver, passing through the canal to European ports. The wheat storage capacity is very great, and the export trade is especially large when the Great Lakes ports are closed by ice. Large quantities of flour are exported, the principal consumers being China and Japan. Lumber and logs and canned and cured fish are other leading exports. Part of the industrial section of the city and many of the piers, warehouses, etc., on the waterfront are built on reclaimed land. Vancouver's manufactures, of which there are about 500, include lumber, shingles, boxes, pulpwood and paper, and other lumber products, ships, canned fish, fruit and vegetables, sugar, chemicals, iron and steel products, flour, marine engines, packed meat, and cans.

The University of British Columbia, just outside the city limits, is beautifully situated at Point Grey, on the tip of the peninsula, overlooking English Bay, Howe Sound, and the Gulf of Georgia. The city also has a technical school and a school of decorative and applied arts, a provincial home for boys and girls, and a school for the deaf and dumb.

Remarkable for the beauty of its surroundings, Vancouver has many pic-

turesque drives following the wooded shores of ocean inlets and leading into the mountains which enclose it on three sides. It has 65 parks, among them the famous Stanley Park, a thousand-acre pleasure ground owned by the Dominion, with trails through the virgin forest, athletic grounds, bathing beaches, a zoo, and other attractions.

The city owes its existence to the Canadian Pacific Railroad, which chose the site in 1885 for its western terminal. In 1886 the frame buildings of the little town were destroyed by fire, and on the ruins grew the new city. Population, 118,000.

Vancouver, Wash., a port and manufacturing center and the county seat of Clarke County, 6 miles north of Portland, Ore., on the Columbia River at the head of deep-water navigation, 100 miles from its mouth. It is served by the Northern Pacific, the Great Northern, and the Spokane, Portland & Seattle railroads, by the Oregon Washington Railroad & Navigation Company, and by vessels from the world's ports. It has a commercial and a military airport. Vancouver Barracks, a United States Army post, is situated here. Vast timber tracts constitute one of the chief natural resources and there are sawmills, and manufacturing of pulp and paper and plywood. Salmon- and fruit-canning, fruit-packing, dairying and poultry-raising, and the manufacture of furniture, linen, and ornamental brick, tile, and concrete are other leading industries. The city is also a distributing center for fruit, nuts, lumber, and canned goods. During the World War it was one of the principal Pacific Coast ship-building centers. Vancouver is the seat of the Providence Academy (coeducational, Roman Catholic), of Columbia Seventh Day Adventist Academy, and of a state school for the deaf and a state school for the blind. The place was founded in 1825 by the Hudson's Bay Company. It was incorporated in 1858 and was chartered as a city in 1890. Population, 14,900.

Vancouver Island, an island off the Pacific coast of North America, polit-

ically a part of British Columbia. It is separated from British Columbia by Queen Charlotte Sound and the Strait of Georgia, both of which are studded with islands, and from the State of Washington by the straits of Georgia, Haro, and Juan de Fuca. It is about 285 miles long, from 40 to 80 miles wide, and its area is about 20,000 square miles. The loftiest peak of its mountainous surface is Victoria Peak (7,484 ft.). The coast is irregular and has numerous fiords. Quatsino, Kyukuot, Nootka, and Barkley are large sounds on the west coast. The mountain slopes are covered with splendid forests. Coal is mined extensively and there are large fisheries of salmon, sturgeon, and herring. Gold, iron, and copper are other resources. Victoria, the capital of British Columbia, is situated on the southeast coast of the island. Vancouver was discovered in 1774 and was circumnavigated by George Vancouver in 1792. The United States claimed it but relinquished it in 1846 under the Oregon Boundary Treaty. It was made a colony by Great Britain ten years later, and in 1866 it was united with British Columbia.

Van' dals, a Teutonic tribe dwelling on the southern coast of the Baltic and the banks of the Oder about 180 A.D. They invaded Italy with other tribes in 406, and while besieging Florence, were surrounded by the army of the Roman general, Stilicho, which put their ruler and 20,000 men to death. They then devastated Gaul until, in 409, the Franks drove them into Spain. In 429, led by King Genseric, they invaded Africa and soon won control of the coast from Tangier to Tripoli. They crossed to Italy in ships and sacked Rome for 14 days in 455, carrying away to Carthage the treasures of the centuries. Among these trophies was the golden candlestick of the Jews that Titus had taken from Jerusalem. They troubled the commerce of the Mediterranean for years and added Sardinia and Sicily to their territory, but were defeated by the Roman general, Belisarius, in 533. The next year Africa

and Sardinia again came under Roman rule. After the Mohammedans conquered the country, all trace of the Vandals as a people disappeared.

Vanderbilt University. Mr. Cornelius Vanderbilt of New York, the eminent capitalist, being desirous of founding an institution of higher learning, decided to locate it at Nashville, Tennessee, that place being regarded as the educational center of the South. The Central University was incorporated in 1872, the name was changed to Vanderbilt University in 1873, when Mr. Vanderbilt made his first donation of \$500,000, subsequently increased to \$1,000,000. Other members of the Vanderbilt family made additions to this endowment, the total amount thus received being nearly \$3,000,000. The school of medicine has been granted in these recent years large appropriations, both by the Carnegie Board and the General Education Board. The gifts of the Carnegie Corporation amount to \$2,500,000; those of the General Education Board to \$5,500,000.

The University at once assumed a leading position in educational matters and has always insisted on a high quality of entrance requirements and high standard of college work. It is not too much to say that the present remarkable interest in educational matters in the South and the excellent school system in Tennessee are largely due to the influence of this University. Students are attracted to it from all parts of the South and its alumni scattered throughout the nation have taken eminent positions testifying to the excellent training for life-work received at this University. Young women are admitted to the University on the same conditions as young men, and participate in the general student activities. The University is affiliated with the George Peabody College for Teachers, whose campus immediately adjoins that of Vanderbilt. This gives to Vanderbilt students the advantage of a thoroughly equipped teachers college.

Van Dyck, *Van Dike'*, Sir Anthony (1599-1641), the greatest portrait painter, next to Rubens, of the Flemish

School. He was born in Antwerp, the son of a wealthy silk mercer, who gave his son the advantages of an early training. While still a youth, Anthony made a friend of Rubens, whose assistant he became; and his style, though free and independent, closely resembles that of his great master. Early in his career Van Dyck visited England, where he painted several royal portraits; later he visited Italy, remaining for a considerable sojourn in Genoa, and refining his style by a study of the Italian masterpieces.

In 1632 Van Dyck was induced to remove to England. Charles I received him with distinction, granted him a yearly pension and conferred upon him the honor of knighthood. His English portraits, conspicuously those of Charles I, Queen Henrietta and two groups of the royal children, are among his most celebrated works. Van Dyck was a thorough man of the world, handsome of person and courtly in manner. He lived in luxurious style, squandering the enormous income which his pictures brought him. The circumstances of his life made him *par excellence* the painter of aristocratic life. The most conspicuous qualities of his work are beauty of color, masterly treatment of light and dark, and grace of poise in his figures.

Van Dyke, Henry (1852-), an American clergyman, writer and educator, born in Germantown, Pa. He was educated at the College of New Jersey, Princeton, at the Princeton Theological Seminary and at Berlin University. From 1878 to 1882 he was pastor of the United Congregational Church at Newport, R. I., and from 1882 to 1900, of the Brick Presbyterian Church, New York City. In the latter year he was appointed professor of English literature at Princeton. In 1913 he received appointment as minister to Netherlands. He has written in various fields, and his style is always attractive. His poetry reveals a combination of rhythm, feeling and fine intellectual quality. His works include *The Builders, and Other Poems*; *Music, and Other Poems*; *The Blue Flower* and *The Ruling Passion*, works of fiction; *Fisher-*

man's Luck and *Little Essays*, volumes of essays; and *The Gospel for an Age of Doubt* and *Sermons to Young Men*.

Vane, Sir Henry (1612-1662), an English statesman, son of Sir Henry Vane, comptroller of Charles I's household. He was educated at Oxford. At an early age he became a Puritan and a Republican. In 1635 he went to New England, where the following spring he became the dashing "boy governor" of Massachusetts. He quarreled with the leaders of the colony because of his religious views, and returned to England in 1637. In 1640 he entered Parliament and immediately joined Pym and the other Parliamentary leaders in their conflict with Charles I. He strongly disapproved, however, of Cromwell's increasing exercise of arbitrary power, and refused to remain in Parliament after "Pride's Purge" (See CROMWELL, OLIVER), taking no part in the execution of the King. Nevertheless, on the establishment of the Commonwealth in 1649, he became one of the most efficient members of the Council of State. After the dissolution of the Rump Parliament in 1653 he definitely broke with Cromwell and withdrew from public affairs. At the Restoration, in 1660, he was excluded from the general pardon, was cast into the Tower on the charge of high treason and was beheaded two years later.

Van Hise, Van Hise', Charles Richard (1857-1919), an American geologist and educator, born at Fulton, Wis. He graduated at the University of Wisconsin in 1879 and has served his alma mater continuously since that time, first as an instructor, from 1886 to 1903 as a professor, and thereafter as president. He was nonresident professor of structural geology at the University of Chicago from 1892 to 1903. Since 1883 he has served as a member of the United States Geological Survey. By his writings he has won recognition as authority on the rocks of the Algonkian and Archæan systems, and especially on the ore-bearing rocks of the Lake Superior region. Since 1909 he has been a trustee of the Carnegie Foundation for the Advance-

ment of Teaching. Under his able administration the University of Wisconsin has won recognition as one of the foremost American state universities. Among his writings are *The Iron Ores of the Lake Superior Region*, *Some Principles Controlling the Deposits of Ores*, *The Lead and Zinc Deposits of the Mississippi Valley* and *The Conservation of the Natural Resources of the United States*.

Van Horne, Sir William Cornelius (1843-1915), a Canadian capitalist, born in Will County, Ill. In 1857 he became a telegraph operator for the Illinois Central Railway, and he later served in various capacities with the Michigan Central, the Chicago & Alton, the St. Louis, Kansas City & Northern, the Southern Minnesota, the Chicago, Milwaukee & St. Paul and the Canadian Pacific, of which he was general manager from 1882 to 1884, carrying the road to completion. From 1888 to 1899 he was president, and from 1899 to 1910, chairman of the board of directors of the Canadian Pacific. He was knighted by Queen Victoria in 1894.

Vanil'la, a name given to a genus of plants of the Orchid Family, which yields the aromatic extract of vanilla from its long pods and seeds. The vanilla plant is native to Mexico and Brazil, and is grown in other tropical countries. The vine bears large white, red or greenish flowers, which are fragrant, and its aerial roots permit it to climb. The fruit is a long, brown bean containing an oily, dark brown aromatic pulp. From this, before ripening, is extracted by a tedious process the oil which is used in medicine and in flavoring. Vanilla beans are now but little used, as cheaper artificial substitutes have been found.

Va'por, a substance in the gaseous form. A vapor is said to be saturated when a very slight cooling or a very slight increase in pressure will cause some of it to condense into a liquid or a solid. A vapor is said to be unsaturated or to be superheated when a considerable increase in pressure is required to cause any of it to condense. When a vapor is

at a temperature higher than a certain critical value, called its *critical temperature*, it can be condensed to a liquid by pressure only, but must also be cooled. The critical temperature of carbon dioxide is $+ 30.92^{\circ}$ C.; of oxygen, -118° C.; of nitrogen, -146° C.; of water, 365° C. Accordingly oxygen and nitrogen are always gases under ordinary conditions of temperature and pressure; water is usually a liquid or a vapor that is readily condensed to a liquid; and carbon dioxide can be solid, liquid or gas without very extreme conditions (See GAS). There is usually no very sharp distinction made between a superheated vapor and a gas, the one condition grading into the other without any noticeable difference. If a vapor obeys the laws of gases with fair accuracy, it is generally called a gas. The steam above the water in a steam boiler is a saturated vapor; if the last drop of water has been evaporated and then the steam heated to a still higher temperature with a resulting greater pressure or volume, the steam is said to be superheated and is unsaturated. Still greater heating and expansion will cause the steam to assume more and more the properties of a permanent gas. Like statements apply to the vapor of any other liquid, such as alcohol, gasoline or even mercury.

The pressure necessary to confine a saturated vapor or the pressure which a saturated vapor exerts is dependent only upon its temperature, and increases as the temperature rises, the increase being more rapid the higher the temperature.

DALTON'S LAW. When a liquid is contained in a vessel with air or any other gas or vapor which does not combine with it chemically, the amount of the liquid that will evaporate and the pressure that its saturated vapor will exert will be the same as though the other gas or vapor were not there, and the total pressure exerted on the vessel will be the sum of the pressures of the gas and the saturated vapor. Evaporation will not be so rapid, however, in this case, as if there were no other gas present. This law holds in the case of water

evaporating into the open air. Evaporation continues until the water vapor becomes saturated at that temperature. The air is then said to be saturated with water vapor. If the air is now warmed without the addition of more vapor, the water vapor is no longer saturated at the higher temperature, and the air is said to be unsaturated. If saturated air is cooled, not all of the water vapor can remain as vapor at the lower temperature, and part of it condenses as snow or rain or is deposited on the surface of the ground as dew or frost. See DEW; FROST; RAIN; SNOW; EVAPORATION; HYGROMETRY.

Va'poriza'tion. See EVAPORATION; CALORIMETRY.

Varicose, *Var' i kose*, **Veins**, veins which are dilated by knotty swellings at the valves. The disturbance usually affects the lower limbs, and is the result of some interference with the flow of blood back to the heart. Persons whose occupations necessitate their standing in the same position for long periods are frequently affected, though walking is never a cause. Varicose veins are painful, though not dangerous, except in the case of bursting of the veins. Treatment consists chiefly in resting and in maintaining the affected parts in an elevated position, and, if necessary, bandaged.

Var'nish, a term given to various solutions of gums or resins in such solvents as alcohol or linseed oil, and employed to produce on various substances a hard, shiny surface for ornament and protection. The varnish must be of such consistency as to allow it to be spread evenly. When it dries it leaves a covering that is glossy or can be made so by rubbing with proper materials. The name of a varnish is frequently given to it by the solvent used; thus spirit varnish consists of a resin dissolved in ethyl alcohol, in methyl (wood) alcohol, in naphtha, turpentine, chloroform or ether. Oil varnishes are those in which the solvent is linseed oil, poppy oil or walnut oil. The gums or resins chiefly employed are amber, animé, colophony and copal. Aloes, dragon's blood, saffron, etc., are used to give color, and are added espe-

cially when the varnish is used to coat metals. Asphaltum, or pitch, is employed to give a black color, and this varnish is called Japan. Shellac varnish is made by dissolving shellac in alcohol.

Var'ro, **Marcus Terentius** (116-27 B. C.), a Roman man of letters, born at Reate, in the Sabine country. He served in several wars, surrendering to Cæsar when he was in Spain as a legate of Pompey. Faithful to the Pompeian forces, who were finally defeated at the Battle of Pharsalia, he was pardoned by Cæsar and commissioned to collect and arrange the great public library at Rome. From this time on he lived in seclusion, and by reason of his diligent studies soon was recognized as the most learned of the Romans, confessing to have written 490 books, of which only two are extant. Among these were a treatise on agriculture, a grammatical work and philosophical and historical writings.

Va'rus, **Publius Quintilius**, a Roman general of the time of Christ. Following his governorship of Syria, Augustus gave him command of the armies of Germany, into which territory he was to introduce the Roman administration. The Germans resented this and, led by Arminius, fell upon the Romans in a forest. Two days later they annihilated them in battle (9 A. D.). Varus killed himself in despair. Augustus was racked with grief, and instead of the Weser, the Rhine was again the Roman boundary. See ARMINIUS.

Vase, a circular vessel generally used for ornament. Vases are of many sizes and forms and have been made by all people who have made decorative pottery. Vases are also made of bronze, pewter, glass and other materials. They have the style of ornamentation in vogue at the time they were made; therefore the ornamentation is a sort of history, telling in what age and by what people the vase was made.

Most ancient people have left vases which tell something of their character and civilization, and the scientific study of these specimens of ancient pottery constitutes a special branch of archæol-

ogy. The nations which have contributed the largest number of vases are those formerly inhabiting Asia Minor, Greece, Etruria, southern Italy, Sicily, islands in the Ægean Sea and those in northern Africa. Among these the Grecian and Etrurian vases are regarded as the most fundamental types. Some of these are elaborate works of art and are highly prized by antiquarians. Most modern vases are made of potter's clay or of glass. Those most elaborately ornamented have groups of raised figures upon them. Those of glass are often noticeable for their beautiful coloring and graceful form. Until recently but few vases were made in the United States, but now some American pottery works are producing vases that for beauty of design and richness of coloring compete with those made in Europe.

Vas'eline, a product of crude petroleum which, when the original mixture is distilled at a temperature of 300° or over, does not become volatile. The vaseline, which remains in the still, is at ordinary temperatures a half-solid substance, white if pure, and of great use in the preparation of salves and ointments. Vaseline is also used in coating metallic articles which would otherwise tarnish when exposed to the air.

Vas'sar College. See WOMEN, COLLEGES FOR.

Vat'ican, the residence of the popes in Rome. It is located on Vatican Hill, north of St. Paul's Church, and is a rectangular edifice with an irregular cluster of buildings at each end. The present structure was begun in the middle of the 12th century and has been enlarged and added to by a number of popes, until now it covers 13½ acres, and has 20 courts and 400 rooms. The Vatican contains some of the greatest art treasures in the world. The ceilings of the Sistine Chapel were decorated by Michelangelo and Raphael with Biblical and allegorical subjects. The Vatican Library was founded by Pope Nicholas V (1447-1455) and now contains over 220,000 volumes and a priceless collection of manuscripts. See ROMAN CATHOLIC CHURCH.

Vatican Council, or **Council of the Vatican**, the 20th Ecumenical Council of the Roman Catholic Church, which met Dec. 8, 1869. It was attended by 749 of the higher clergy, whose principal work was to consider the promulgation of the dogma of papal infallibility. This dogma was officially proclaimed at this council. On Oct. 20, 1870, the gathering was prorogued by Pius IX owing to the taking of Rome by Victor Emmanuel.

Vedas, *Va' daz*, the collections of sacred texts constituting the Hindu scriptures. They consist of four books, the *Rigveda*, the *Sāmaveda*, the *Yajurveda* and the *Atharvaveda*, which are accompanied by other books in the nature of commentaries. The *Rigveda*, the oldest and most important of the collections, consists of about 1000 priestly hymns addressed to the gods and recounting their deeds. The earliest of the hymns date from B. C. 1200 to B. C. 1500. The *Sāmaveda* is a collection of stanzas of praise set to music by means of definite musical notations. The *Yajurveda* represents the growth of ritualism and is composed mainly of verses taken from the *Rigveda*, with the sacrifice the central theme. In addition there are many blessings and curses. The *Atharvaveda* is a collection of 730 hymns, divided into 20 books. The contents are superstitious rather than religious, giving a picture of the lower life of ancient India. The *Sāmaveda* and *Yajurveda* are employed for ritual purposes and are of secondary importance. The Vedas as a whole are characterized by the subtle philosophy peculiar to the Indian mind. See BRAHMANISM.

Ved'der, Elihu (1836-1923), an American painter and illustrator, born in New York City. He studied in Paris and later in Italy, returning to the United States at the outbreak of the Civil War. At the close of the war he went back to Paris, studying in that city and also in Rome. Vedder is one of the most original of present-day illustrators. His works are not numerous, but possess very high order of merit. They include the following titles: *Roman Girls on the*

Seashore, Cumean Sibyl, Lair of the Sea Serpent, Phorcydes, The Greek Actor's Daughter, Venetian Model and several others in the Boston Museum. His most famous book illustrations are for Fitzgerald's translation of Omar Khayyám, which are world-famous. His principal decorative pieces are a panel for Bowdoin College and several pieces in the Congressional Library at Washington.

Veer'y. See THRUSH, subhead *Wilson's Thrush*.

Vega Carpio, Va' gah Kahr' pyo, Felix Lope de (1562-1635), a Spanish poet and dramatist, better known as Lope de Vega, born in Madrid. He studied at the Imperial College under the Jesuits and began to write plays at an early age. It is thought that he participated in the expedition against the Azores in 1582; after becoming a priest he entered the Order of St. Francis. He wrote in both the comic and tragic vein, and dealt with historical, religious, legendary and picaresque subjects; in all he produced from 1500 to 1800 plays. His dialogues are spirited and he possesses an exuberant invention and an extraordinary power for developing character. He ranks as one of the foremost writers in Spanish literature. His works include *Hermosura de Angélica* (a continuation of Ariosto's *Orlando Furioso*), *San Isidro*, *Pastores de Belén*, *Dorotea*, a series of prose tales and numerous plays.

Vegetable, Vef' e ta bl, I'vory. See IVORY PALM.

Vegetable Oyster. See SALSIFY.

Vegetarianism, Veg' e ta' ri an iz'm, the practice of living solely upon a vegetable diet. The doctrine of vegetarianism is of ancient origin. About the middle of the 19th century the subject began to receive wide attention and the doctrine to claim numerous adherents. Vegetarians maintain that meat has an injurious effect upon both the mind and the body, that it is a common conveyor of disease, and that vegetable diet is not only cheaper than meat, but that it conduces to a longer life. Those holding to the mixed diet theory advance the views that man's teeth, stomach and intestines are

made to masticate and digest animal as well as vegetable food, and that such a diet supplies a greater percentage of fuel for bodily energy than that consisting of vegetable foods alone.

Veins, in anatomy, the tubes or pipes forming a part of the circulatory system of the body. The arteries carry the blood through a multitude of branches, which end in minute tubes called capillaries; the veins, beginning as capillary continuations of the arteries and increasing in size as they proceed, carry the blood back to the heart. The veins in the lower extremities unite to form the vena cava inferior; those in the head and other upper extremities flow into the vena cava superior. Pulmonary veins carry the blood from the lungs to the heart. Both venæ cavæ empty into the right auricle of the heart, the pulmonary veins into the left auricle. The walls of the veins, like those of the arteries, are composed of successive layers, which vary in number according to the size of the tube. Unlike the arteries, the veins collapse when empty and have no pulse. On the inner surface of the veins are folds of membrane which act as valves. They flatten against the wall of the tube during the ordinary course of the blood, but open and check its flow in a contrary direction. A wound in an artery emits spurts of blood; from a wound in a vein the blood flows in a slow, steady stream. The flow of blood from an artery should be stopped by pressing upon the artery between the wound and the heart; to check the issue of blood from a vein, pressure should be between the wound and the extremities. See ARTERIES; BLOOD; HEART; CIRCULATION.

Veins, in geology, masses of rock which occupy fissures of other rock. Veins occur in perpendicular layers of varying depths, sometimes extending into the earth several hundred feet. They may be composed of igneous rock, rocks of sedimentary origin, or may consist of minerals deposited by water or other similar natural agencies. Those belonging to the first group are the re-

sult of repeated inflows of molten matter and are commonly called dikes; sedimentary deposits are made by accumulations of loose earthy material, such as sand and gravel. Fissures filled by secretions from water sometimes contain valuable ores. Such veins are called lodes. See DIKE.

Velásquez, *Vay lahs' kathe*, **Diego Rodriguez de Silva** (1599-1660), the leading painter of the Spanish School and one of the greatest masters of all time. He was born in Seville, the son of Juan de Silva, of a noble Portuguese family. He was a pupil of Herrera and of Pacheco, whose daughter he married. His earliest works, religious subjects and scenes of everyday life, are in the style of the Spanish naturalists. In 1622 he visited Madrid, where his work was brought to the attention of Philip IV. So successful was his portrait of the King that he was appointed court painter. On the advice of Rubens he visited Italy in 1630, and was strongly influenced by Guido Reni, as evidenced in the *Forge of Vulcan* and *Joseph's Coat*, painted at this time.

In 1649 he revisited Italy, where he painted two famous portraits, *Pope Innocent X* and *Juan de Pareja*, the latter pronounced the greatest portrait of the 17th century. On his return to Spain he was presented with the Cross of Santiago, the highest honor attainable by a Spanish nobleman. The portraits of his last period embrace *Marianna of Austria*; the *Infanta Margarita*; *Philip IV* in old age; *Las Meninas*; *Las Hilanderas*, in which light and color are treated with consummate skill; court jesters, including *Barbarossa*, *Don Juan de Austria*; dwarfs, *Sebastian de Morra* and *El Primo*; and idiots, *El Bobo de Coria* and *El Niño de Vallegas*; *Æsop* and *Menippus*. The *Coronation of the Virgin* and *The Anchorites* also were painted at this time. In purely technical qualities Velásquez holds supreme rank. His art is objective and naturalistic; he painted what he saw, but that with such perfection that the subject tells the story. He is the dominant influence today in the art

of England, of the United States and of France.

Vel'vet, a well-known fabric made from silk, in which, besides the ordinary warp and weft, which are usually arranged as in twill weaving, there is an additional weft consisting of short pieces of thread doubled under the regular weft and brought to the surface in loops, which are so close together as to conceal the regular web. Afterwards the loops are cut evenly, and the ends thus made look like a covering of very short fur. When cotton and woolen goods are woven in a similar manner, they are known respectively as velveteen and plush. The richest and most artistic fabrics on Italian looms in the 15th and 16th centuries were largely velvets, while other similar textiles were made in Spain and Flanders for ecclesiastical vestments, altar cloths and hangings. Velvet came originally from China, where the process of weaving it was first invented.

Veneer', a thin layer of valuable wood, such as mahogany, rosewood or maple glued to the surface of a cheaper one, such as pine or fir, in order to give it the appearance of being made wholly of the valuable material. It is employed chiefly in furniture and for interior finishings. Thin sheets of ivory, mother-of-pearl and other substances are used in covering less valuable materials so as to give them an ornamental surface. Wood veneers are made by special machines which saw the material into sheets of extreme thinness, one side of which is allowed to be rough in order to hold the glue.

Venezuela, *Ven" e zwe' la*, a republic of northern South America, bounded upon the n. by the Caribbean Sea, on the e. by the Atlantic Ocean, the Gulf of Paria and Guiana, on the s. by Brazil and on the w. by Colombia. It has an area of 394,000 sq. m., a little greater than the combined areas of Texas and New Mexico.

PHYSICAL CHARACTERISTICS. Venezuela is divided by the Orinoco River and is well watered by its tributaries. To the southeast of the Orinoco and reaching

to the Pacaraima Mountains, that form the natural boundary with Brazil, are the Guiana Highlands; they are largely unexplored, but so far as known, they form a plateau sloping to the Orinoco on the north. They are from 6000 to 11,000 ft. in height and their most noted peak is Mt. Roraima. West and north of the Orinoco lie the extensive llanos, which slope gradually to the river. They vary in character from vast virgin forests to rolling plains, where great herds of cattle feed. In this section cattle herding is the chief industry. At the north and west near the Colombian boundary is a mountainous region, a continuation of the Andes Mountains extending almost to the coast.

CLIMATE AND PRODUCTS. Venezuela has all varieties of climate. Near the coast is a tropical region, with luxuriant vegetation of varied forms. Among the cultivated products are coffee, cocoa, sugar cane, cotton, cinchona, tobacco, sarsaparilla, indigo and vanilla. Venezuela is one of the greatest coffee-producing countries of the world. Rubber and dyewoods also form valuable products. In the higher altitudes a temperate climate prevails, and this region is said to be among the most delightful and healthful of the world. Higher still in the mountains is the region of continual winter.

INDUSTRIES. The country has a store of minerals, gold, silver, copper, lead, iron, sulphur, coal and asphalt, all of which are mined with profit. About one-fifth of the population is engaged in agriculture, and great ranches, sugar plantations and cocoa and coffee estates are common in the pastoral region. Along the coast and especially near the Island of Margarita the pearl fisheries are extensive. There are few manufacturing establishments. The highways are primitive, and traffic is carried on by means of pack animals or rude carts; the country has less than 500 m. of railway, although some of the cities have electric lines. The ports are visited by boats of all the great steamship lines. La Guaira is the chief port.

GOVERNMENT AND PEOPLE. Venezuela has been a republic since 1829, when it separated from Colombia, but its present constitution has been in effect only since 1909. The president is elected by Congress for a term of four years. He acts in conjunction with a cabinet and a Council of Government. In case of death or disability of the president a member of the Council takes his place. The legislative authority rests in a Congress composed of two houses. Carácas is the capital and the most important city. The people of Venezuela are a mixture of Spanish, Indian and negro; their language and customs are chiefly Spanish, and Catholicism is the State religion.

HISTORY. Venezuela was discovered by Columbus in 1498 and was visited and named by Vesputius in 1499; the name means Little Venice and refers to the Indian village that he found built on palisades over Lake Maracaibo. The first Spanish settlement dates from 1500, when Spanish adventurers began to exploit the pearl fisheries. For the two centuries that it belonged to Spain, the country was explored, but suffered much from misrule and internal strife; moreover, many of the natives were enslaved. As early as 1810 Venezuela began struggling for freedom, and, in 1821, through the efforts of Bolivar, Venezuela and New Granada were united as Colombia; but Venezuela seceded eight years later, and its real independence began in 1831. Since then there have been over 50 revolutions with nearly 30 chief executives, besides numerous liberators, restorers and dictators. With slight interruptions, Guzman Blanco ruled despotically from 1873 to 1888, and the country had become prosperous when he, in his turn, was deposed.

Besides having boundary disputes with its neighbors, Venezuela has been in frequent quarrels with European powers. Trouble with Great Britain became so serious that, in 1894, the United States suggested arbitration. This was agreed to, and a special tribunal settled the boundary between Venezuela and British Guiana in 1899. Later, Venezuela dis-

puted with France, Germany and England over the payment of claims which it owed to the subjects of these countries. Again, at the intercession of the United States, the Court of Arbitration at The Hague settled the dispute.

In 1901 Cipriano Castro became the president and ruled as a dictator until 1908, when he went to Europe; Gen. Juan Vincenti Gomez acted in his place. In 1910 Gomez became president and at once began restoring the friendly relations with those powers which Castro, in his years of misrule, had offended.

Venezuela's most recent international difficulties occurred in 1908, when diplomatic relations between it and Netherlands were severed, and when there were reprisals of Dutch vessels along the Venezuelan coast; and in 1910, when there was a quarrel with Colombia over certain lands claimed by both countries. The case of the Orinoco Steamship Company, in which the United States was interested, was finally settled at The Hague in 1910. Population, about 2,412,000.

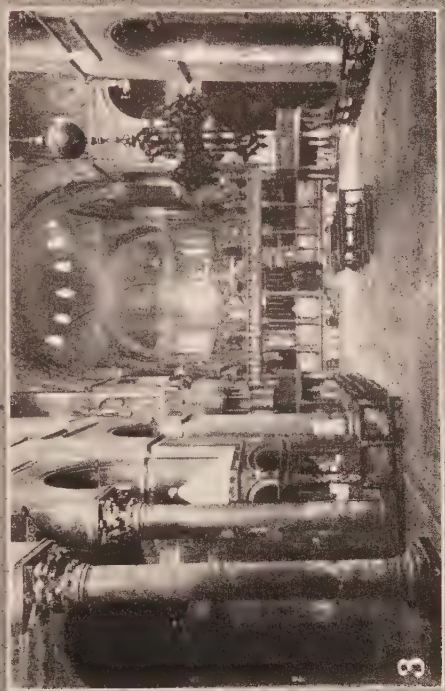
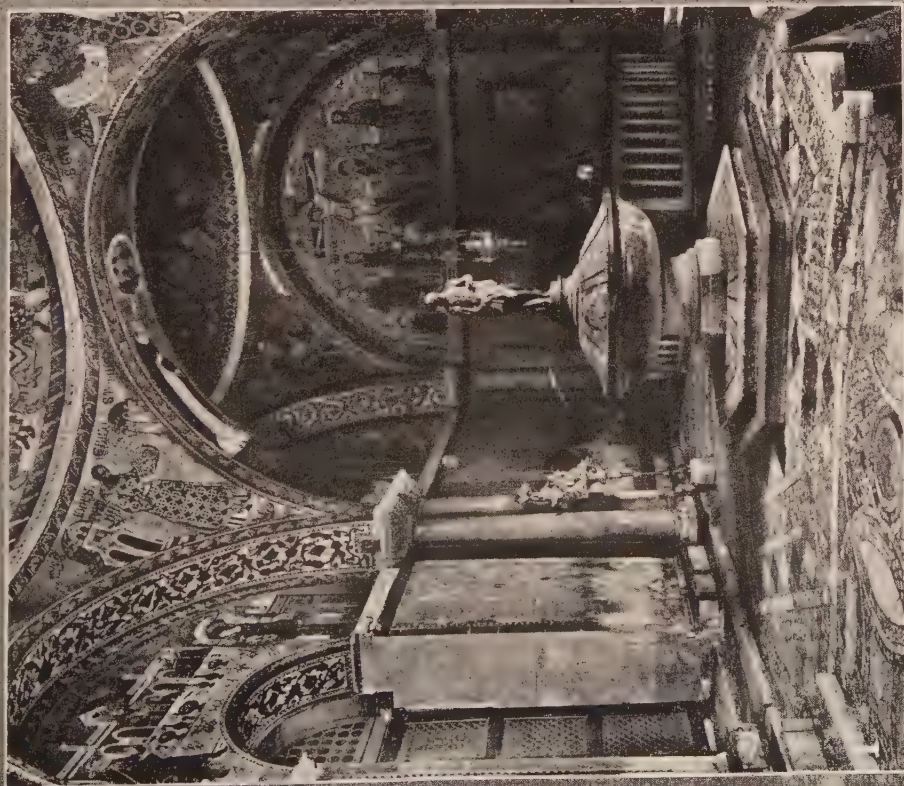
Venezuela, Gulf of, or Gulf of Maracaibo, *Mah" rah ki' bo*, an inlet of the Caribbean Sea, situated in the north-western part of Venezuela. It is 165 m. long and 50 m. wide. The Lake of Maracaibo communicates with it through a narrow passage on the south, on each side of which are low peninsulas.

Venice, *Ven' is*, a seaport of northern Italy, capital of the province of the same name, situated on 120 small islands in a lagoon of the Adriatic Sea, 164 m. by rail e. of Milan. The site is one of the most remarkable in the world, for the islands are only low mud banks that are often entirely submerged when the winds cause the waters to rise several feet. The oozy soil can support buildings only by means of pile driving; for drinking water the inhabitants depend on the rainfall; there is no opportunity for agriculture or for rearing cattle, the lagoons yielding fish as the sole food supply. None the less, Venice is the most beautiful of cities, with its 16,000 buildings, and their shadows and lights, magically reflected in the sheen of the waters of the sea

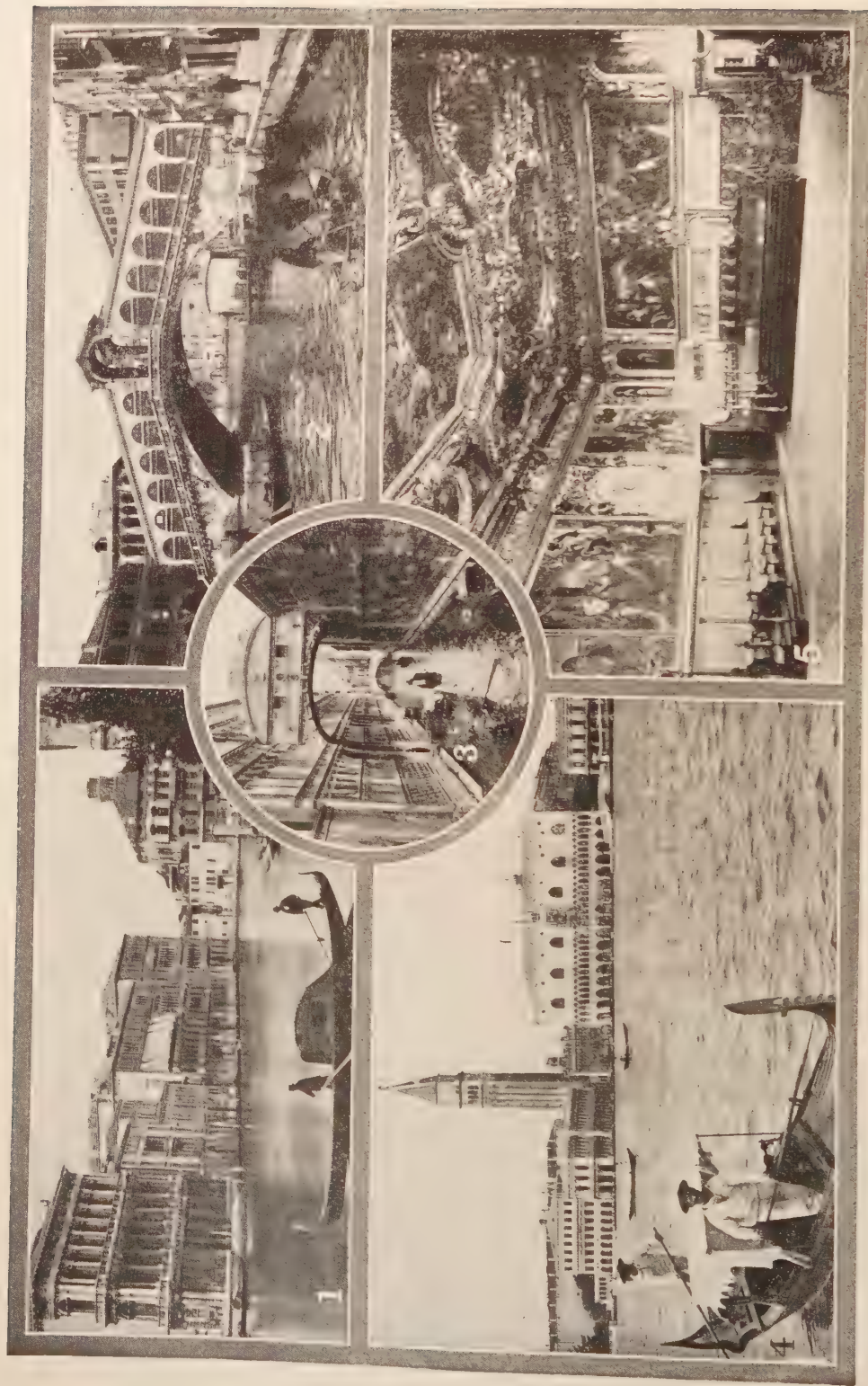
beneath, under the blue of the Italian sky. Despite the natural drawbacks, this group of islands, called Rialto, became the home of a race that played a magnificent part in the medieval and Renaissance movement of Europe. It is now, because of its quiet and beauty, a favorite winter resort for tourists, although the weather is often foggy and raw.

CANALS, BRIDGES, STREETS AND PUBLIC BUILDINGS. The Grand Canal zigzags its way through the heart of the city in the form of a letter S, and divides it into practically two equal parts. There are about 150 smaller canals, which serve as streets, and they are crossed by 400 bridges, of which the majority are stone-stepped. The most famous one is the "Bridge of Sighs," connecting the rear of the Doge's Palace with the prison containing horrible places of confinement in use until 1797. There are a few narrow, winding streets and picturesque alleys, but the chief thoroughfares are the canals. Gondolas, formerly richly colored but now a compulsory black, and steamers take the place of horses and cabs.

The Piazza of St. Mark is the chief square and the center of the life of the city. It is the most beautiful and fashionable promenade, moonlight and band music adding to its enchantment by night. During the day a unique feature is the flock of pigeons hovering over it, waiting to be fed by the passers-by. In the eastern part of the square are the Doge's Palace and the cathedral. Most of the buildings of Venice possess unsurpassed beauty of architecture. The most famous is the Cathedral of St. Mark, in form a Greek cross with a large dome in the center and one surmounting the end of each arm. Within is the far-famed and splendid array of mosaics. In decoration and richness of material it is unparalleled. Other edifices of importance include the two Procuratie, formerly the residences of the nine ancient dignitaries of the city, the Atrio, the clock tower, the royal palace, the Church of Santi Giovanni e Paolo, the Church of San Sebastiano, the Santa Maria Gloriosa dei Frari, the Church of Santa Maria della Salute, the noble palaces too numerous to mention and three theatres—the Goldoni, the Fenice and the Rossini. The Academy of Fine Arts contains renowned masterpieces from the earliest down to the present time, such as those by Bellini, Titian, Paul Veronese, Tintoretto and Carpaccio. In addition to this are the Royal Institute of Fine Arts and the Royal Institute of Sciences, Arts and Industry. The art collections of Venice scattered throughout the city are very rare, and all its external architecture as well reflects the fact of its former greatness as a center of art. The bell towers, or *campanili*, are numerous, although many have been destroyed by earthquakes. The Campanile of



VENICE. (2) St. Mark's Cathedral. (1 and 3) Interior views of the basilica.



VENICE, THE CITY BUILT OVER WATER. (1) Grand Canal. (2) Rialto Bridge. (3) Bridge of Sighs. (4) Doges' Palace from water front. (5) Interior Ducal Palace.

Venice, or the great tower of San Marco, collapsed on July 14, 1902, but its reconstruction was immediately begun and completed in 1910. Venetian sculpture is not extensive, for through jealousy of the republic the erection of monuments to great men was once forbidden. The Arsenal, one of the most renowned institutions of Venice, employs 6000 men, and is by far the finest of its kind in the world.

COMMERCE AND INDUSTRIES. In point of traffic Venice is the seventh Italian port. Recent improvements have opened the harbor to wider shipping, and inland navigation has been promoted. The glass-bead industry, formerly of great importance, suffered for some time from overproduction but has now regained its former position. Lace making, once thought to be a lost art, has been revived, and is now carried on in flourishing factories. Other industries are ship-building, wood carving, and the manufacture of torpedoes, heavy machinery, chemical fertilizers, cotton and woolen goods, clocks, mosaics, bronzes, jewelry and glassware. The principal glass manufactory is situated a short distance north of the city. During the 15th century Venice won distinction for the excellence of its textile manufactures. The shops of Venice are among the most famous in Europe.

GOVERNMENT AND HISTORY. A prefect representing the Crown and responsible to the central government at Rome administers civic affairs, such as questions of health, public order and Parliamentary elections. Matters more local in nature are controlled by a town council. The early history of Venice is obscure. A sturdy fisherfolk lived there in retirement and undisturbed, until the time of the barbaric invasions of Europe, when the ravages of the Huns and Lombards drove many of the inhabitants of the mainland to seek refuge on the lagoons. By 810 the inhabitants, who had suffered long from internal dissensions, found it necessary to unite in order to successfully resist the attacks of Pippin, son of Charles the Great. The city concentrated at Rialto, and from this time on there was a united people in a single city. During the Crusades Venice became a commercial state, and as the trade expanded, a powerful wealthy class developed. The most glorious period of its history was immediately before the capture of Constantinople by the Turks, which event cut off a large part of its Eastern trade. The discovery of a new sea route to India in 1497 was fatal to Venetian commerce, and a period of decline and corruption set in. In 1797 the greater part of the Venetian Republic was ceded to Austria, but was returned to the Kingdom of Italy in 1805. It was again in the hands of the Austrians, but became incorporated in United Italy in 1866. Population 169,563.

Venizelos, Eleutherios (1864-), Greek statesman, diplomat, and patriot,

born on the island of Crete. Elected deputy to the Cretan legislature in 1887, young Venizelos threw himself heart and soul into the revolution against Turkey, soon rose to the leadership of the movement, and, in 1898, brought about the withdrawal of the Turks. Called to Athens, in 1910, as prime minister, by King Constantine, he revised the Greek constitution and gave the country a stable government. Under his guidance Greece passed successfully through the two Balkan wars. At the outbreak of the World War, Venizelos resigned due to King Constantine's refusal to join the Allies. Recalled to the premiership, he again found himself unable to agree with the pro-German king and once more resigned. In 1916, he set up the Saloniki government in opposition to King Constantine. On the forced abdication of the king in 1917, Venizelos was reinstalled at Athens. He immediately threw Greece's support to the Allies. For the next three years he was virtual dictator of Greece. During the peace conferences of 1919 and 1920, he secured great territorial advantages in Asia Minor and Thrace for his country. But his political influence was gradually undermined, and in November, 1920, after being defeated in the general election, he retired to private life. Following the overwhelming defeat of the Greeks in Asia Minor by the Turks, in 1922, King Constantine was forced to abdicate. The party of Venizelos then regained its ascendancy and he was appointed official delegate of Greece at the Allied capitals.

Ven'tila'tion. See HEATING AND VENTILATION.

Ve'nus (in Greek, Aphrodite), Roman goddess of love and beauty, popularly said to have leaped from the sea foam. Reared by ocean nymphs till her beauty was ripe, she was then led to Olympus. Each god wished her for a wife, but she flouted them all. Jupiter gave her to Vulcan, whom she never ceased to hate. She did, however, love Mars and the mortals Adonis and

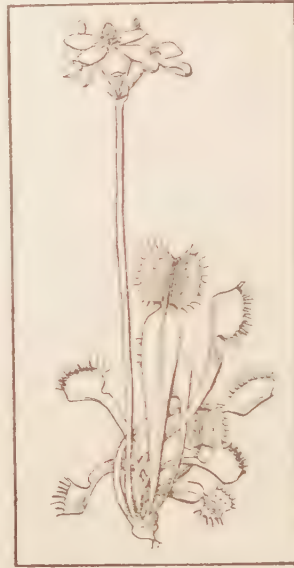
Anchises. By the god she became mother of Cupid; by Anchises, of Æneas. The worship of Venus, which was principally observed at Cythera and Cyprus, was restricted mostly to the young. She owned a magic girdle, the Cestus, which could inspire love. Swans, sparrows and doves were her favorite birds and sacred to her were the rose and the myrtle. Cupid was her faithful companion.

Venus, the planet of the solar system second outward from the sun. Its mean distance is 67,200,000 m.; its diameter is 7700 m.; it moves in its orbit at the rate of 1296 m. per minute; its day is thought to be 225 of our days; and its year is 224.7 of our days, or seven and one-half months. Venus, though its mean distance from the sun is greater than that of Mercury, in its revolution approaches nearer to the sun than any other of the planets, and is the most brilliant of them all, so brilliant, indeed, that it casts a distinct shadow when there is no moon, and is sometimes visible in the daytime. It is the most beautiful evening and morning star, never being seen for more than three hours when the sun is invisible. Venus passed across the face of the sun in 1882. The next transit will occur June 8, 2004, and the next, June 6, 2012. The spectroscope indicates that there is watery vapor present about Venus and there are also evidences of atmosphere. When seen through the telescope Venus presents phases similar to those of the moon.

Venus's Flytrap, a curious and somewhat rare plant of the Sundew Family, a family all of whose species are provided with means of entrapping insects. This particular species grows wild only in peat swamps near Wilmington, N. C., and is there becoming less common. Because its roots are loosely attached in soil which lacks nitrogen, the leaves have become traps to capture the food which will supply this lack. The leaf stem is a flattened stalk, narrower near the root. The leaf blade is made of two rounding halves, fringed with stiff bristles, and upon the surface of each are three high-

ly sensitive outgrowths. If an insect alights upon the leaf and touches these sensitive bristles, the halves snap quickly together and a liquid is excreted by

means of which the insect is digested. After the assimilation of the food products the leaf again opens and awaits its next victim. The flower of the Venus's flytrap, which appears from April till June, is a white, scentless blossom with five flat petals. The flowers grow in a cluster



VENUS'S FLYTRAP

at the top of a slender, leafless stem, which rises much higher than the leaves. The flytrap is produced in greenhouses as a curiosity.

Vera Cruz, *Va' rah Kroos'*, a city of Mexico and its principal seaport. It is situated upon the Gulf of Mexico, 193 m. e. of the City of Mexico, and is unique in its architecture, since the most of its buildings are made of coral, as is also the old wall about the city. The introduction of modern methods of sanitation has much improved the city. Vera Cruz has few buildings of importance; many of the ancient churches are now used for commercial purposes. The harbor is protected by breakwaters and has been improved by dredging and by the building of wharves. The principal exports are gold, silver, copper, coffee and hides. Population, about 49,000.

Verbe'na, a garden plant of the Vervain Family, used frequently as a border plant. The narrow, stemless leaves are in whorls about the spreading stems,

and the purple, scarlet or variegated flowers grow in a loose spike. The flowers are tubular in form, flattened at the margin and five-parted. The leaves and flowers are lemon-scented. There are many varieties in cultivation. *Verbena* is also the botanical name of an allied genus commonly called vervain. This genus has a number of species among the wild flowers and weeds.

Verdi, Vair' dee, Giuseppe (1813-1901), the greatest Italian composer of the 19th century. He was born at Le Roncole, in Parma, and received his first instruction from the organist of the village church. After two years' study at the Academy of Busseto, he was apprenticed to the president of the Philharmonic Society of that city, studying composition and orchestration with the conductor of the society; in 1833 he himself became conductor, after an interim of study at Milan. His first opera, *Oberto*, was produced with marked success in 1839.

Among his earlier works besides those already mentioned are *Ernani*, *Rigoletto*, *Il Trovatore*, *La Traviata* and *Don Carlos*. His most celebrated work, *Falstaff*, was one of his latest productions.

Verdigris, Vur' di grees, a compound formed by treating copper with acetic acid. It is of a greenish color and is used in the manufacture of pigments and dyes. It is a virulent poison.

Verdun, Battle of, the name of a series of battles fought between February 1, 1916, and July 1 of the same year, for the possession of Verdun, France. It constituted the first phase of the great German offense on the West front for that year. During the war, there were three great forward movements on the part of Germany to take Paris and thereby end the war. The campaign of 1914 culminated in the Battle of the Marne lasting one week; the great offense of 1918 lasted seven months and was waged along a battle front of 250 miles. In the contracted area around Verdun, for five months in 1916 the concentrated might of Germany met the despairing valor of France; and

on the issues of that battle depended the very life of France as a nation, the fate of Europe as a whole, and the civilization of the world.

There was massed around Verdun the greatest number of heavy guns ever gathered for battle purpose, and the attack opened with the greatest bombardment ever known. The number of shells thrown far exceeded the total number of shells used in our Civil War of four years; and these shells were of a size previously undreamed of, and filled with powerful explosives unknown in former wars. The German ring of steel nearly surrounded the city, the outer forts were taken, but the ancient citadel of Verdun resisted to the last and the result was a defeat for Germany.

Vergil, Vur' jil (70-19 B. C.), a Roman poet, born on the banks of the Mincio, near Mantua. His full name was Publius Vergilius Maro. The little that is known of his life is obtained rather from other Roman writers of his time than from his own works. His father gained a livelihood from farming and beekeeping and succeeded in giving the son a liberal education. In 53 B. C. Vergil went to Rome, and his studies were directed to philosophy, medicine and mathematics. He is then thought to have retired to the seclusion of his father's farm for ten years or more, when he "cultivated his woodland muse" and read diligently, chiefly in Greek literature. He then removed to Rome, and joined a literary circle which included among others, the poets Varius, Mæcenas and, later, Horace. Vergil began the composition of the *Georgics* and of the *Æneid*, having completed the original draft of the latter before B. C. 19, when he set out to visit Greece and Asia. Meeting Augustus in Athens, the poet was prevailed upon to give up his project of spending three years in Asia in revising his work. Instead he returned to Italy with Augustus, but the sea journey was fatiguing and he died shortly after landing at Brundisium.

Vergil was a grave and gentle man, dreading the prominence which his suc-

cess had brought him. In his earliest poems, the *Eclogues* or *Bucolics*, his themes are pastoral and he delights in dwelling on his love of nature and simple country life. Following this, he wrote a poem on agriculture, under the title of *Georgics*. It was published in B. C. 29. With realistic faithfulness he surrounds the daily labor of the Roman countryman with an atmosphere of poetry and beauty; and turns commonplace details into attractive forms. It is the most perfect of his poems, and one of the most highly polished works of art that literature possesses. The *Æneid*, however, represents the poet at his best, despite the fact that it was left in so unfinished a state that in his last illness he requested to have the manuscript burned. This pathetic desire was unheeded, and the world is the richer by one of the most masterly epics it has ever known. His definite purpose in writing the poem was the glorification of Rome and of the Julian line. It is more than the epic of national life; it is the epic of human character, with a predominant religious idea, that of a divine purpose being carried out irrespective of human wishes. For the story of Æneas and an outline of the poem see *ÆNEAS*; *ÆNEID*. In the history of literature Vergil's influence has been great; it is reflected in the writings of Dante, Milton, Ariosto, Tasso, Chaucer, Spenser, Tennyson and others.

Ver'mes. See **WORM**.

Vermil'ion, a bright red pigment, prepared by bringing together in a revolving drum, sulphur, mercury and a solution of potassium hydroxide in water, and heating to about 115° F. Vermilion was formerly the basis of nearly all red paints, since it can be used equally well with water or oil and is a permanent color. It has, however, been quite generally replaced by aniline dyes, mixed with white lead for a base.

Vermont', **THE GREEN MOUNTAIN STATE**, one of the New England States, is bounded on the n. by the Province of Quebec, on the e. by New Hampshire, on the s. by Massachusetts and on the

w. by New York. The Connecticut River forms the eastern boundary, and the deepest channel of Lake Champlain, that portion of the western boundary extending through the lake. This gives to Vermont most of the islands.

SIZE. The length from north to south is 157½ m., the length of the northern boundary is 90 m. and of the southern, 41 m. The average width of the state is 57½ m. and the area is 9564 sq. m., of which 440 sq. m. are water. Vermont is the second New England state in area, a little larger than New Hampshire and about equal to Massachusetts and Rhode Island combined. It is the 42nd state in size in the Union.

POPULATION. In 1920 the population was 352,428; between 1910 and 1920 there was a loss in population of 3,535, or 1 per cent. There are 38.6 inhabitants to the square mile. In 1900 the population was 343,641.

SURFACE. The Green Mountains extend over the state in a nearly north and south direction, a little west of the median line, and form its most striking physical feature. These are low, rounded mountains with their slopes covered with farms and forests. The highest peak is Mt. Mansfield, 4364 ft., in Lamoille County. Other prominent peaks are Killington, 4241; Camel's Hump, 4088; Mt. Lincoln, 4078; and Jay Peak, 4018. North of the center of the state these mountains divide into two ranges, one of which extends in a northeasterly direction. The western range has transverse valleys formed by the Lamoille and Winooski rivers. The Taconic Mountains extend northward from Massachusetts to about the central part of Vermont. They are west of the Green Mountains and parallel with them, and are much lower. North of the Taconic Mountains and between the main range and Lake Champlain are a few isolated hills of red sandrock. Also along the eastern border near the Connecticut River are a number of low, round summits, some of which are granitic. The lowest land is the shores of Lake Champlain, which is about 90 ft.

above sea level. Between the mountain ranges are numerous intervening valleys separated by low hills.

RIVERS AND LAKES. The Connecticut River extends the entire length of the state and drains the eastern part. Its most important tributaries from Vermont are the Passumpsic, the Wells, the White, the Black, Saxton's and West. Nearly all the western part of the state is drained into Lake Champlain. The principal streams flowing into the lake are the Missisquoi, the Lamoille, the Winooski, Otter Creek and the Poultney. Smaller streams are found in the valleys and flowing down the mountains in all parts of the state.

Vermont has over 360 lakes and ponds, all distinguished for their clear water and beautiful shores. Lake Champlain, with a shore line of over 150 m., is by far the most important of these. Lake Memphremagog, having a length of over 30 m., extends into the northern part of the state from Canada. Lake Willoughby, in Orleans County, is over six miles long, and Lake Bomoseen, in Rutland county, is also important.

SCENERY. The valley of Lake Champlain, lying between the Green Mountains and the Adirondacks, is one of the most beautiful valleys in North America. Lake Willoughby, lying between two mountains with vertical faces, is one of the most remarkable scenic features in the state. The intermingling of mountain, hill and valley, the numerous sparkling streams, often beautified by cascades and waterfalls, and the freshness of vegetation everywhere combine to form a region whose scenery is noted for its beauty and charm wherever the name of Vermont is known.

CLIMATE. The climate is that of the cool temperate regions, and is subject to sudden changes at all seasons. However, these changes are so modified by local conditions as to make the climate salubrious and healthful. The mean annual temperature ranges from 40° in the north to 47° in the south. January is the coldest month, and occasionally the thermometer may go as low as 30°

below zero. In July it may rise to 90° or more, but these extremes are of short duration. The annual rainfall ranges from 30 to 45 inches; deep snows are common, especially among the mountains. All sections of the state are free from severe storms.

MINERALS AND MINING. There are extensive deposits of marble in Rutland and Bennington counties, and Vermont ranks first among the marble-producing states. The quarries in Rutland County are among the largest in the world, and are of unusual interest because of their depth and the methods employed in handling and working the rock. Granite ranks next to marble in importance. The largest quarries are at Barre, Woodbury, Calais, Kirby, Bethel and Rochester. Slate is quarried at many points in Rutland County, which contains more than 100 quarries. Vermont ranks next to Pennsylvania as a slate-producing state. The rock quarried in Rutland County is of the finest quality, and is used for blackboards and interior finishing. Limestone is quarried in a number of places, and a beautiful green syenite is found on Mt. Ascutney. Talc, soapstone and asbestos are also mined.

FORESTS AND LUMBER. In the earlier period of her history, nearly all the state was covered with forests. Pine, spruce, hemlock, balsam fir and cedar were the soft woods found in large quantities, and among the hard woods the sugar maple, elm, beech and birch predominated. Most of this land was cleared and converted into farms by the early settlers. However, some of it has been reforested by a second growth, and many of the mountains are still covered with forests. Lumbering is carried on in nearly all parts of the state, but on a smaller scale than formerly, and much of the product is for local consumption. Spruce is the most important variety of lumber manufactured, and in its production Vermont leads the Union.

AGRICULTURE. Agriculture is the chief industry, and its pursuit gives employment to a larger number of persons than any other industry within the state.

When compared with the farms in the Central and Western states, Vermont farms are small, and, owing to the nature of the soil, intensive farming is practiced in most localities. Most of the farms are tilled by their owners.

Soil. Along the streams the soil in the so-called meadows is deep and highly fertile; that on the uplands contains less humus, but in most sections is well adapted to growing hay, corn, oats and potatoes. In the western part of the state the soil contains clay and lime.

Products. The principal field crops are corn, oats, barley, rye, buckwheat, hay and potatoes. Apples and small fruits are grown in Grand Isle and Chittenden counties, and tobacco is an important crop in the southeastern part of the state along the Connecticut River.

Raising live stock is a very important branch of agriculture. The hills and mountains afford excellent pasturage, and horses, cattle, swine and sheep are found on nearly every farm. Vermont has long been famous for its Morgan horses. It is also widely known for its excellent butter, and many farms are devoted almost entirely to dairy husbandry. Vermont is the leading state in the production of maple sugar, and the annual output amounts to about 12,430,000 lb., valued at about \$2,000,000.

MANUFACTURES. The numerous mountain streams furnish an abundance of water power, and the development of the electric motor has made possible the use of many power sites which were formerly worthless because inaccessible. As a result, manufacturing industries have increased rapidly since 1890, and factories large and small are found in many villages and towns.

The manufacture of butter has been taken from the farm and is now carried on almost entirely in creameries, one or more of which are found in almost every town. The annual output of butter exceeds 27,250,000 lb., valued at more than \$12,500,000. Next in importance is the manufacture of lumber and its allied products. This industry is quite evenly distributed over the state, and is carried

on in small mills and factories. The manufactures connected with the marble, granite and slate industries, such as making monuments and interior finishing, are also extensive. Woolen factories are found in a number of localities, and factories for the manufacture of knit goods are also common. At Bellows Falls are extensive paper and pulp mills, and factories for the manufacture of agricultural implements. Brattleboro is famous for the Estey Organ and Piano Works, whose products are found in every state and city. Scale works are located at Rutland and St. Johnsbury, the latter containing one of the largest plants in the United States.

TRANSPORTATION AND COMMERCE. The Central Vermont Railway extends through the state from north to south, forming a section trunk line from Boston to Montreal and thence westward. The Rutland Railroad extends from Essex Junction southward through the western part of the state, and a line of the Boston & Maine system extends the length of the state on the eastern side. These roads, with numerous cross lines, constitute adequate railroad facilities for the state. Lines of steamers ply regularly on Lake Champlain during the summer. This lake is connected by canals with the Hudson and St. Lawrence rivers, thus forming a continuous waterway from the St. Lawrence to the Atlantic at New York City. The country roads are better than in most states, and they are being improved each year. A number of electric lines connect near-by towns and villages, and these lines are constantly being extended. There are excellent transportation facilities throughout the state, and all farm homes are practically within easy reach of railway communication.

A thriving commerce is maintained between the farms and local towns and cities, and between these cities and Boston and other large markets in the Eastern States. Marble, granite, dairy products, lumber and maple sugar constitute the chief exports, while the imports are such foodstuffs and manufactured articles as are not produced within the state.

GOVERNMENT. Vermont has had three constitutions, the first adopted in 1777, and the third in 1793. Twenty-eight amendments have been added to the last constitution, the first of them in 1828 and the last in 1883. The governor, lieutenant-governor, state treasurer, auditor-of-accounts and state secretary are chosen at a general election for a term of two years. The inspector of finance, tax commissioner, superintendent of education and three railroad commissioners are elected by the General Assembly for two years. The Legislature consists of a Senate and House of Representatives, and is known as the General Assembly. The Senate consists of 30 members apportioned among the counties according to population, with the provision that each county must have one senator. The House of Representatives consists of one member from each town, making 247 in all. All members of the Legislature are elected for two years. Sessions are held biennially and are not limited in time.

The judiciary consists of a Supreme Court of five judges, a Court of Chancery, County and Probate courts in each county, and local courts presided over by justices of the peace. The judges of the Supreme Court are elected by the General Assembly for two years. All other judicial officers are elected by the people.

The township is the unit for local administration, and town officers are elected annually at a town meeting. The most important of these officers are the selectmen, three or five according to the population of the town; clerk, treasurer and superintendent of schools.

EDUCATION. The public school system is under the general direction of a superintendent of education. The township is the unit for local administration. In some parts of the state adjoining towns are grouped into supervisors' districts, each district being in charge of a special superintendent. Where this arrangement is not in vogue, the schools of each township are under supervision of a town superintendent. Revenue for the public schools is derived from interest on the school fund and from state

and local taxation. The University of Vermont and State Agricultural College is at Burlington. State normal schools are maintained at Johnson and Castleton, and there is a school of agriculture at Randolph. Higher institutions of learning not under control of the state are Middlebury College at Middlebury; Norwich University at Northfield; Montpelier Seminary at Montpelier; St. Johnsbury Academy at St. Johnsbury; and Poultney Academy at Poultney. All the cities and larger villages maintain high schools of excellent grade.

STATE INSTITUTIONS. The hospitals for the insane are at Brattleboro and Waterbury. There is an industrial school at Vergennes; the House of Correction is at Rutland and the state prison at Windsor.

CITIES. The chief cities are Montpelier, the capital; Burlington, Rutland, Barre, St. Albans, St. Johnsbury, Brattleboro and Bellows Falls.

HISTORY. Vermont (from the French *Verts Monts*, or Green Mountains) was first visited by Champlain in 1609. Some 50 years later, the French built trading forts along the western boundary. After 1741, being separated from Massachusetts, the territory was claimed by New Hampshire and by New York. George III confirmed the claim of New York, which the "Green Mountain Boys," led by Ethan Allen and Seth Warner, hotly resisted. Vermonters distinguished themselves during the Revolution, and the British even attempted to win them to their cause. In 1790 Vermont paid New York \$30,000 for renunciation of its claim. The following year it entered the Union, the first state to be added to the original thirteen. For the Civil War it furnished about 35,000 troops. It was the scene of a Fenian raid in 1866 and in 1870. Western migration has kept the population of Vermont almost stationary for years. Consult Robinson's *Vermont*, in the American Commonwealths Series.

GOVERNORS. Thomas Chittenden, 1778-1789; Moses Robinson, 1789-1790; Thomas Chittenden, 1790-1797; Paul Bringham, 1797; Isaac Tichenor, 1797-

1807; Israel Smith, 1807-1808; Isaac Tichenor, 1808-1809; Jonas Galusha, 1809-1813; Martin Chittenden, 1813-1815; Jonas Galusha, 1815-1820; Richard Skinner, 1820-1823; Cornelius P. Van Ness, 1823-1826; Ezra Butler, 1826-1828; Samuel C. Crafts, 1828-1831; William A. Palmer, 1831-1835; Silas A. Jenison, 1835-1841; Charles Paine, 1841-1843; John Mattocks, 1843-1844; William Slade, 1844-1846; Horace Eaton, 1846-1849; Carlos Coolidge, 1849-1850; Charles K. Williams, 1850-1852; Erastus Fairbanks, 1852-1853; John S. Robinson, 1853-1854; Stephen Royce, 1854-1856; Ryland Fletcher, 1856-1858; Hiland Hall, 1858-1860; Erastus Fairbanks, 1860-1861; Frederick Holbrook, 1861-1863; J. Gregory Smith, 1863-1865; Paul Dillingham, 1865-1867; John B. Page, 1867-1869; Peter T. Washburn, 1869-1870; George W. Hendee, 1870; John W. Stewart, 1870-1872; Julius Converse, 1872-1874; Asahel Peck, 1874-1876; Horace Fairbanks, 1876-1878; Redfield Proctor, 1878-1880; Roswell Farnham, 1880-1882; John L. Barstow, 1882-1884; Samuel E. Pingree, 1884-1886; Ebenezer J. Ormsbee, 1886-1888; William P. Dillingham, 1888-1890; Carroll S. Page, 1890-1892; Levi K. Fuller, 1892-1894; Urban A. Woodbury, 1894-1896; Josiah Grout, 1896-1898; Edward C. Smith, 1898-1900; William W. Stickney, 1900-1902; J. G. McCullough, 1902-1904; C. J. Bell, 1904-1906; F. D. Proctor, 1906-1908; G. H. Prouty, 1908-1910; J. A. Mead, 1910-1912; A. N. Fletcher, 1912-1914; C. W. Gates, 1914-1916; H. F. Graham, 1916-1918; P. W. Clement, 1918-1920; J. Hartness, 1921-1923; Redfield Proctor, 1923-1925; F. K. Billings, 1925—.

Vermont, University of, at Burlington (1791). This institution opened in 1800. Next to the University of Pennsylvania, it is the oldest state university in the Northern States; in the New England group the only state universities are those of Vermont and Maine, the latter of which was opened in 1868. The University of Vermont includes the college of liberal arts, the state agricultural college, a college of medicine opened in

1809, and a college of engineering. The corner stone of Old College was laid in 1825 by General Lafayette.

Verne, Jules (1828-1905), a French novelist, born at Nantes. He studied law at Paris and soon won success with his writings, which were chiefly accounts of extravagant adventures, so cleverly told that the fanciful incidents practically pass as truth. His works have been widely translated, even into Arabic and Japanese; they were crowned by the French Academy and he was made a member of the Legion of Honor. The most popular novel was his *Tour Around the World in Eighty Days*. The chief interest of all his work is incident, and not character drawing; and for this reason his novels have lent themselves readily to dramatization, and have had great success on the stage. His writings include *Five Weeks in a Balloon*, *Twenty Thousand Leagues Under the Sea*, *The Mysterious Island*, *Michael Strogoff*, *Christopher Columbus* and *Hector Servadac*.

Veronese, *Va' ro na' say*, Paul, the popular name of Paolo Cagliari (1528-1588), the famous Venetian painter, the son of Gabriele Cagliari, the sculptor. From his father he first learned the technique of his profession; and additional instruction under his uncle, Antonio Badile, further developed his genius. He worked in many Italian cities, but is identified with the Venetian School, of which he was one of the greatest exponents, taking rank with Titian and Tintoretto. His Biblical and historical scenes are remarkable for inventiveness, masterly and complex arrangement, color and dramatic power. In this class belong *The Marriage at Cana*, *Calling of St. Andrew to the Apostleship* and *Banquet in the House of Simon the Pharisee*. Veronese painted numerous portraits and heads, among them those of Queen Mary of England, Titian, Tintoretto, Vittoria Colonna, Charles V, Queen Eleanor of France and Sultan Solyman I. Other miscellaneous canvases include *Family of Darius at the Feet of Alexander*, *Consecration of St.*

Nicholas and St. Helena and Rape of Europa.

Verrazano, *Ver'' raht sah' no*, Giovanni da (about 1480- about 1527), a Florentine navigator, the first sailing under the French flag in American waters. In 1524, under favor of Francis I of France, he sailed to find a western waterway to China, and touched the coast of America near Cape Fear. According to various accounts, Verrazano was hanged as a corsair or died while preparing to return to America. His voyage has aroused sharp controversy; for the only evidences of authenticity are a letter, supposedly written by himself to Francis I, July 8, 1524, and a map made by his brother.

Versailles, Treaty of, the official name of the treaty between the Entente and the Teutonic Allies closing the World War. The details of the treaty were arranged at the Peace Conference that met in Paris January 18, 1919, but it was signed in the Hall of Mirrors in the Palace of Versailles June 28 of the same year.

This treaty was the most important treaty ever made. It terminated the greatest war ever known, and marks the beginning of a new age in history, and it was the climax of a series of events that necessitated drawing a new map of Europe, Western Asia, and Africa. It further provides for the establishment of a League of Nations in itself an earnest effort to abolish war. (See WORLD WAR in Study Guides, sub-head *Treaty of Peace.*)

Versailles, *Ver salze'*, a city of northern France, 10 m. s.w. of Paris. It is famous because of the magnificent palace built by Louis XIV. The gardens, fountains and waterworks are of special beauty. The Church of Notre Dame, the Cathedral of St. Louis, the Protestant Church, the English Chapel, the schools and training colleges are other important buildings. Market gardening, distilling and the manufacture of boots and shoes represent the industries. From 1871 to 1879 Versailles was the official capital of France. Population, about 65,000.

Ver''tebra'ta, one of the great divisions of the animal kingdom and the one which contains the largest and most highly specialized animals. Its special characteristics, held by each member of the family, is an articulated spinal column, or backbone, which divides the skeleton symmetrically and contains a tubular spinal cord. The external sides of the body are also symmetrical, though the internal are not. The nervous system has its center in the brain, which is protected by the bony box called the skull and near which all the special sense organs are located.

The body of a Vertebrate is generally elongated and is surmounted by the head; there are never more than two pairs of limbs, the upper of which may be fitted for special purposes and are variously known as arms, legs, fins or wings, according to their uses. Respiration is carried on by means of gills in aquatic Vertebrates, and of lungs in terrestrial Vertebrates; its object is to furnish oxygen for the blood. The digestive system is highly specialized and includes a complicated system of organs, arranged in the ventral cavity of the trunk. The classes of Vertebrata arranged in order of importance are Mammalia, Birds, Reptilia, Batrachia and Fish. Each of these groups is treated under its title.

Ver'tigo, a disturbance of the brain causing dizziness and temporary impairment of vision. It may arise from a deficient or oversupply of blood to the brain, from nervous debility, or it may result from the unpleasant sensation to the optic nerve caused by swiftly moving objects, experienced sometimes on railway trains. Vertigo is not infrequently a symptom of approaching epilepsy or paralysis.

Vespa'sian (9-79), a Roman emperor, son of a Sabine laborer, rough in speech and manners but honest and broad, with a lofty sense of the dignity of his office. He was made emperor in 69 after the year of anarchy following Nero's death, and quickly brought the country under his rule. He left a son, Titus, to complete the war in Judea.

Vespasian reduced the expenses of the empire and built great public works. To insure the succession he wisely associated his son Titus with him in the government. See **TITUS**.

Ves'pers, the afternoon division in the Roman Catholic office of the breviary. The customary psalms, versicles and hymns at that hour are in the nature of an evening prayer.

Vespu'cius, Americus. See **AMERICUS VESPUCCI**.

Vest, George Graham (1830-1904), an American statesman, born in Frankfort, Ky., and educated at Center College and at Transylvania University, where he studied law. Removing to Missouri, he there began to practice. In 1860 he entered the State Legislature, from 1863 to 1866 served in the Confederate Congress and from 1879 to 1903 was United States senator, in this capacity leading the Democrats and gaining distinction as an orator.

Ves'ta (in Greek, Hestia), Roman goddess of the public and private hearth, was worshiped, with the Penates, at meals, when the family gathered about the 'hearth. Each community kept lighted, on a hearth, the sacred flame of Vesta, and colonists always had with them some of the old home-fire from which to kindle a blaze for the new. At Vesta's Temple in the Forum, Vestals, her priestesses, kept ever lighted the sacred flame upon the preservation of which was thought to depend the safety of the city. Her festival, the Vestalia, fell on June 9.

Vest'ments, Ecclesiastical and Sacred, garments worn by priests to indicate their station and to give special significance to the celebration of ceremonies. They are of two kinds, ecclesiastical and sacred. The ecclesiastical vestments are those that priests wear to denote their offices, the principal one being the soutane, or cassock, a robe reaching to the feet, fastened in front and having long sleeves. For priests it is black; for bishops it is violet; for cardinals it is red; for the pope it is white.

Sacred vestments are those worn by priests in discharging their duties, as the amice, alb, girdle, maniple, stole, chasuble, veil, cope, surplice, and biretta. Some must always be white; but the ornaments proper are of the color required by the office and mass of the day.

Vestris, The, Lamport & Holt liner on the New York-Buenos Aires run, sank off the Virginia Capes Nov. 12, 1928. Out of 326 aboard 111 were lost, including all of the 13 children and 25 of 33 women. The *Vestris* was built in 1912, had just been inspected, and was commanded by the commodore of the line, Capt. Wm. J. Carey, a seaman of distinguished record. The vessel was loaded with heavy machinery, and sailed from New York, Nov. 10, with a list. This increased in a heavy sea, and the ship sprang leaks on the 11th. Through failure to appreciate the danger, no SOS was broadcast until the morning of the 12th, too late for prompt assistance. When lifeboats were finally ordered, the cant of the ship made it impossible to launch them, and most were capsized. The vessel sank at 2:30, the captain going down with her. Survivors were not picked up until the following day.

Vesu'vius, a volcano just east of the Bay of Naples, about 10 m. s.e. of the city. Its height varies with the effects of eruptions, but averages about 4000 ft. It is partly bounded on the north by a semi-circular cliff, Monte Somma, believed to be the crater of an extinct volcano. The base is 30 m. in circumference. Except for occasional lava beds the slopes are covered with vegetation.

The first recorded eruption, in 79 A.D., buried Pompeii and Herculaneum in a flow of hot mud. Another eruption in 1631 deluged the near-by village with lava and boiling water. The eruption of 1822 took 800 ft. off the summit, which subsequent eruptions have replaced in altered form. The mountain now terminates in an elliptical chasm over 15,000 ft. in circumference and 1000 ft. deep, into which it is safe to descend with the aid of a guide. The most recent erup-

tions occurred in 1872, 1878, 1880, 1895 and 1906. Considerable loss of life and property was caused by the last. Between its periods of violent activity the crater emits poisonous gases and cinders, which have the appearance of smoke. A railway has been built from Naples to the within 150 yards of the crater for the convenience of visitors, and on the western slope of the mountain at an elevation of 2200 ft. is located an observatory. See POMPEII; HERCULANEUM; VOLCANO.

Vetch, a slender, climbing plant of the Pulse, or Pea, Family, probably introduced from Europe, where it is used as a fodder plant. The stem, which is delicate and prostrate upon the ground if it can find nothing to climb upon, grows only two or three feet long. The leaves are made up of four or five pairs of long, round leaflets, slightly notched at the tip. The flowers are solitary or borne in pairs on slender, curving stalks, and have the usual characteristics of the pea blossoms: a tubular, five-parted calyx, five irregular petals arranged in butterfly form, somewhat united stamens and a slender pistil. The fruit is a narrow pod. In European countries vetch is quite widely cultivated; in America it is considered a harmless, not unpleasant weed. Vetch is also frequently known as tares but is not the tares mentioned in the Bible; this latter is probably darnel-grass, a species of grass much resembling wheat.

Vet'erinary Medicine, the art which relates to the nature, causes and treatment of the diseases of domestic animals, especially to those of cattle and horses. Its field now includes milk and meat inspection, regulating traffic in live stock, establishing quarantine and stamping out animal plagues. In large cities dogs, cats and other pets are looked after by veterinary specialists. Veterinary schools are maintained in several prominent universities and at a number of agricultural colleges, and the progress of veterinary medicine has kept pace with that of human medicine. Now the graduates of veterinary schools have a thorough understanding of the subject and are able

to practice intelligently. The courses require a knowledge of anatomy, physiology, *materia medica* and the use of drugs and medicine. The students are also taught surgery and veterinary dentistry. The drugs used in veterinary medicine are practically the same as those used by physicians, but they are administered in larger doses than for man, the dose depending upon the size of the animal. For instance, a larger dose would be required for a horse than for a dog.

Most surgical operations on animals are performed without the use of anæsthetics, such as chloroform or ether, because it is believed that the pain suffered by the animal is less injurious than the struggles accompanying the administration of the anæsthetic and the deleterious after effects would be.

The Bureau of Animal Industry of the United States Department of Agriculture devotes much time to the study of veterinary problems. The bureau employs a large number of skilled inspectors, who are scattered over the country for the purpose of investigating diseases among domestic animals, enforcing state and national veterinary laws and inspecting milk and meat. The importance of this work is almost beyond estimate, since it is vitally related to the maintenance of the health of the people. The bureau also issues a large number of bulletins, papers and books, all treating upon veterinary subjects. Most of these are for free distribution, and the others are sold at cost of publication.

Ve'to, in political science the right of the executive to disapprove a resolution or act of the legislative body. By this provision the various departments of a government are made mutually responsible for all enactments. A veto may be absolute or qualified, as in the United States, where the disapproval of the president may be overridden by a two-thirds majority of each house. France makes use of the suspensive form, where the veto merely works a suspension of the law until repassed by an ordinary majority. The advantage of the qualified veto as a check upon ill-

advised legislation early appealed to the framers of the Federal Constitution, which provides that every bill which has passed both houses of Congress shall be presented to the president for his approval, but if disapproved it must be returned by him with his objections to the house in which it originated. The house must then reconsider the bill. If re-passed by a two-thirds vote of both houses, it becomes a law despite the executive veto. The potent weapon known as the "pocket veto" gives the president the privilege of retaining a bill for ten days (Sundays excepted). In such case a bill becomes a law without his signature unless the adjournment of Congress in the meantime prevents its return. This proviso in effect gives the president an absolute veto on all bills passed during the last ten days of the session, since he has only to retain them in order to nullify them.

The same privilege of passing a bill over a veto is permitted state Legislatures and the boards of aldermen of cities; in many instances in these bodies only a majority is needed to support the measure on the second occasion.

Viburnum, *Vi bur' num*, or **Arrowwood**, a genus of shrubs belonging to the Honeysuckle Family, and constituting the greater part of the underbrush of forests. They are also found along roadsides and in uncultivated tracts all over the United States. The viburnum when growing freely is a shapely shrub; the leaves are fine with smooth or coarsely-toothed margins, and in many species they are evergreen. The flowers, which are small, grow in spreading clusters much like those of the elder, a member of a related genus; they are white or pinkish in color and have wide-spreading, five-lobed corollas. In most species they appear in May, but some, which are house plants, are winter flowering. The fruit is a small black, blue or red berry, generally sour and unpleasant to the taste.

Our most common viburnums are variously called sheepberry, black haw, hobblebush, dockmackie, wayfaring tree

or sweet viburnum, laurestinus and arrowwood. The laurestinus is cultivated from southern Europe and is not a hardy plant. The arrowwood is so called because the Indians used its straight, slender stems for making arrows.

Vice-President, officially the second person in authority in the Government of the United States and chosen for the same term and in the same manner as the president. The qualifications for vice-president are that he must be a natural-born citizen of the United States and have attained the age of 35 years and been 14 years a resident within the United States. Although described as an executive officer the vice-president has no executive functions to perform, his chief duty being to preside over the deliberations of the Senate. He also presides at a joint meeting of the two houses when the electoral votes are counted. Not being a member of the Senate, he is not entitled to vote except in case of a tie. For the same reason he cannot participate in the selection of Senate committees, that option being reserved to the members themselves. As presiding officer of the Senate he is empowered by the Constitution to preside at trials for impeachment, with but one exception, that is, when the president of the United States is tried. Then the chief justice presides. The vice-president is made by the Constitution the successor of the president in case of death, resignation, removal from office or permanent disability to discharge the duties of the office. He is inaugurated the same day as the president, the ceremony taking place in the Senate Chamber immediately after the president takes the oath of office. The salary is \$12,000 per year. See **PRESIDENT**; **ELECTORAL COLLEGE**.

Vicks'burg, Miss., a city, port of entry and the county seat of Warren Co., 44 m. w. of Jackson, on the Mississippi and Yazoo rivers and on the Alabama & Vicksburg, the Yazoo & Mississippi Valley, the Vicksburg, Shreveport & Pacific and other railroads. Transporta-

tion is also facilitated by several steamboat lines. The leading industry is the construction and repair of rolling stock for steam railways. Manufacturing, chiefly of cotton and lumber products, is extensively engaged in, and there are cotton compresses, cottonseed-oil mills, lumber mills, furniture factories and box and basket factories. The city has dry docks and carries on a large trade in long-staple cotton, cultivated in the surrounding region. Prominent buildings and institutions of Vicksburg are the Federal Building, city hall, courthouse, the Medical College of the University of Mississippi, All Saints' Episcopal College (Protestant Episcopal), St. Francis Xavier's Academy and St. Aloysius College (Roman Catholic), a state charity hospital, sanitarium, infirmary and public library. There is a National cemetery here, and the Vicksburg National Military Park occupies the site of Vicksburg battlefield of 1863. After the erection of several forts by the French, Spanish and pioneers from the United States, the first permanent settlement was made in 1811 on the Plantation of Rev. Newell Vick, from whom the place derives its name. It was incorporated in 1825, and in 1836 was chartered as a city (See VICKSBURG CAMPAIGN). Population in 1920, 18,072.

Vicksburg Campaign, during the Civil War a series of operations which calculated to win Vicksburg for the Federals and end Confederate control of the Mississippi, occurring Dec. 20, 1862, to July 4, 1863. Grant and Sherman commanded the Union troops, about 50,000 in number, and the campaign opened with Sherman's embarking at Memphis, on the fleet commanded by Porter, for a position immediately north of Vicksburg, to which point Grant was simultaneously advancing from the land side. But this plan failed, the Confederate cavalry having committed fearful ravages, which caused Grant to retreat, and Sherman having been defeated with great loss at Chickasaw Bayou. The following January the campaign was resumed, Sherman being ordered to capture

the Confederate right end at Haines's Bluff, while McClernand and McPherson were sent to a point below Vicksburg, taking an overland march west of the Mississippi. Meanwhile, the supply boats ran the batteries at Vicksburg, under Porter's protection, and on Apr. 30 the army and fleet met about 25 m. south of that city. Early in May they were joined by Sherman's corps, and on the 7th Grant began his daring cam-



BATTLEGROUND OF VICKSBURG

paign of cutting himself off from his base at Grand Gulf, of destroying Johnston's 15,000 men near Jackson, before they could join Pemberton, and of then facing Pemberton himself, whom he hoped to beat in a battle and force to retreat into Vicksburg. This plan succeeded. In 11 days Grant had marched 150 m., had won victories at Raymond, Jackson, Champion's Hill and Big Black Bridge, and had stationed himself on the heights around Vicksburg, upon which he made assaults on the 19th and the 22d. A regular siege was then begun, the Federal army being almost doubled by reinforcements, and Porter's fleet

keeping up an incessant bombardment from the river. After six weeks the Confederates were forced to surrender, and on July 4, Vicksburg, with 37,000 prisoners of war, 172 cannon and 70,000 stand of arms, fell into the hands of the Federals. Pemberton's casualties during the campaign had been 10,000. With the simultaneous victory at Gettysburg, the capture of Vicksburg marked the turning point in the Civil War.

Victor Emmanuel II (1820-1878), King of Sardinia from 1849 to 1861 and of Italy from 1861 to 1878. Under his strong rule Sardinia gained a firm position as a constitutional monarchy and gained a place in the Congress of Paris in 1856. Victor Emmanuel formed an alliance with France, which enabled him to add to his dominions Lombardy, Tuscany, Modena and Parma. Later Garibaldi won Sicily and Naples, thus forming United Italy. Feb. 26, 1861, the Italian Parliament declared Victor Emmanuel King of Italy. Venetia was gained in 1866 after the Austrian defeat at Sadowa, and Rome followed in 1870 at the outbreak of the Franco-German War. For the rest of his reign, Victor Emmanuel followed a policy of reconciliation with Austria and of alliance with Germany. See ITALY, subhead *History*.

Victor Emmanuel III (1869-), King of Italy, born in Naples and educated by his mother and private tutors. He entered the army at the age of 18 and received promotions rapidly, becoming commanding general at Naples in 1897. In 1900 his father, Humbert I, was assassinated, and he ascended the throne. He is thoroughly conversant with military and civil affairs and is a forceful, liberal and just ruler.

Victoria, Vik to' ri a, (1819-1901), Queen of the United Kingdom of Great Britain and Ireland and Empress of India, the daughter of Edward, Duke of Kent, and Victoria Mary Louisa, fourth daughter of Francis, Duke of Saxe-Coburg-Saalfeld. She was born in Kensington Palace and christened Alexandra Victoria. Her father died when

she was eight months old, and she was carefully educated by her mother and the Duchess of Northumberland, who prepared her for the high station she was to occupy. Her uncle William IV died June 20, 1837, and Victoria was proclaimed queen June 21. She was crowned at Westminster June 28, 1838. Previous to her ascending the throne, Princess Victoria had been kept much in seclusion, and the people knew but little of their young sovereign. However by her sympathy, tact and good judgment she soon won the confidence of her ministers and the affection of the people, retaining both throughout her long reign. She opened her first Parliament in person, and the closing paragraph of her speech from the throne may be considered as a brief statement of the policy from which she never departed:

"It will be my care to strengthen our institutions, civil and ecclesiastical, by discreet improvement wherever improvement is required, and to do all in my power to compose and allay animosity and discord."

The most important premiers of her reign were the following: Melbourne (till 1841), Peel (1841-46), Russell (1846-52 and 1865-66), Derby (1852, 1858-59 and 1866-68), Aberdeen (1852-55), Palmerston (1855-58 and 1859-65), Disraeli (1868 and, as Earl of Beaconsfield, 1874-80), Gladstone (1868-74, 1880-85, 1886 and 1892-94), Salisbury (1885-86, 1886-92 and 1895 to the end of the reign), Rosebery (1894-95).

Although the Queen was a promoter of peace, during her reign the British Empire was engaged in a number of wars, all of which resulted in extension of territory. Among these were the Opium War with China, the Crimean War, the mutiny in India, the Afghan War and the Boer War. Among the most important civil events of her reign were establishment of the penny post, repeal of the Corn Laws, repeal of the Navigation Laws, the elementary education act and extension of the franchise. Among the measures of international importance were the assumption by

the Queen of the title of Empress of India; trouble with the United States during the Civil War in America; the establishment of British control in Egypt; the formation of the Federation in Canada and Australia; and the promulgation of imperialism which bound together in a common interest all parts of the British Empire in bonds stronger and more permanent than ever before in its history. In 1840 Victoria married her cousin Prince Albert of Saxe-Coburg-Gotha. The union was founded on mutual affection and was a remarkably happy one, and the death of the Prince Consort in 1861 was a blow from which the Queen never recovered. To them were born four sons and five daughters. The eldest, the Princess Royal, Victoria, married Frederick William, who in 1888 became Emperor of Germany as Frederick III. Albert Edward, the eldest son, succeeded Victoria at her death as Edward VII.

After the death of her husband, Victoria secluded herself from public life, the social functions of her court being discharged by the Prince of Wales and by her daughters. In 1887 the people of the great empire over which she ruled celebrated the golden jubilee of the 50th anniversary of her reign, and in 1897 the 60th anniversary was celebrated by the diamond jubilee, in which representatives from all colonies were present and took part in a grand pageant in London. On Jan. 22, 1901, Victoria died. With one exception, that of Louis XIV, her reign of 64 years, 7 months and 2 days is the longest in history. During her reign the Queen became the most eminent woman of the world. She was universally trusted and revered, while her kind heart and sterling domestic virtues won for her an enviable place in the hearts of her subjects.

Victoria, B. C., a seaport and the capital and commercial center of British Columbia, at the southeast end of Vancouver Island, on the straits of Juan de Fuca and Georgia at the entrance to Puget Sound, and on the Canadian Pacific and Canadian National railroads,

whose trains are brought from the mainland on ferries. There are also passenger and automobile ferries communicating with the mainland. There is a good harbor with government and private docks and a large government drydock; and the city has steamship connection with the foreign ports of the Pacific. Victoria is a very English city and has become extremely popular as a tourist resort. Among the noteworthy buildings are the provincial Parliament buildings, the Anglican and Roman Catholic cathedrals, and the Dominion Astrophysical Observatory, one of the largest in the world. The educational institutions include a provincial normal school, Victoria College, Brentwood College, and a number of private secondary schools. The city has an aged ladies' home, an old men's home, the Protestant Orphanage, and Queen Alexandra Solarium. Lumbering, fishing, and shipbuilding are among the leading industries and there are manufactories of Portland cement, paints and varnishes, wrapping paper and roofing materials, and toys and wooden domestic articles. The site was settled in 1843 as a fort of the Hudson's Bay Company. It was incorporated as a city in 1862. Population, 40,000.

Victoria, a state of Australia occupying the extreme southeastern part of the continent. It is roughly triangular in shape and is separated from New South Wales on the northeast by the Murray River, and from Tasmania on the south by Bass Strait, while South Australia is its western neighbor. It is the smallest of the Australian states and has an area of 87,884 sq. m., or about the same as the Island of Great Britain. The state is crossed by Great Dividing Range and the Australian Alps, known by different names in different sections. The highest peaks, Mt. Bogong (6508 ft.), Mt. Feathertop (6303 ft.) and Mt. Hotham (6100 ft.), are not of such elevation as to reach the line of perpetual snow. In the western part of the range are the craters and cones of various extinct volcanoes.

The climate of Victoria, though sometimes exceedingly hot in summer, is ordinarily the mildest of Australia. The plains have scant vegetation and in places become almost deserts. On the mountains, however, there are luxuriant forests, where tree ferns, acacias and eucalyptus trees grow to mammoth size.

As in other Australian states, mining and the production of wool are the chief industries. Gold, tin and coal are the chief minerals produced. The government of Victoria is vested in a governor, appointed by the British Crown, and a



VICTORIA

Parliament of two houses. Melbourne on Port Phillip Bay is the capital and largest city. Population, about, 1,600,000.

Victoria, in Roman mythology, the goddess of victory, identical with the Greek goddess Nike. Many temples were erected in her honor at Rome, among them one on the Palatine Hill, dedicated in 294 B. C., during the Samnite Wars. Victoria was represented with two wings, crowned with laurel, and holding a branch of a palm tree.

Victoria, Victoria Regia, *Re' ji a*, or Amazon Water Lily, an immense and handsome member of the Water Lily Family and native in backwaters, bayous and shore curves of the Amazon River. The plant is truly regal, for its magnificent floating leaves are the largest known and sometimes attain a diameter of six feet or more. The leaves are flat and round, with the edges turned up in a high rim which has two well-marked indentations directly opposite each other. The stem joins the leaf on the underside near the center. Underneath, the leaves are reddish-brown and somewhat ribbed, a condition which is continued upon the outer surface of the rim and adds to the beauty of the leaf. The flowers are of the same general form as other lilies but are much larger. The green, pointed buds rise among the leaves and are dark at first. As they begin to open, the lighter green sepals begin to show, and then the many pure-white petals, which gradually shade into the golden stamens. The Victoria has been introduced into public and private aquatic gardens of the United States, where the plants are greatly admired by all who see their mammoth leaves and beautiful blossoms.

Victoria Cross, a bronze maltese cross, decoration of the British military and naval service. In the center is the royal crown surmounted by a lion, beneath which is the inscription "For Valour." It was instituted in 1856 by royal warrant and first bestowed by Queen Victoria in 1857.

Victoria Falls, the largest and most magnificent waterfall in the world. It is located on the Zambesi River in Rhodesia, central Africa, about 100 m. below the confluence of that river with the Kwando. The river, at this point nearly a mile wide, falls over a ledge in four main cataracts, separated from one another by small islands on top of the ledge, and plunges into a chasm. Above the falls clouds of vapor rise to a height of from 1000 to 3000 ft., according to the season. The chasm into which the water falls is a trough of basaltic rock about one mile long (its length being the same as the river's width), 400 ft. deep and from 100 to 300 ft. in width. The only outlet to this chasm is a narrow gorge about 200 ft. wide, into which the tremendous volume of water dashes

with terrific momentum, only to be almost immediately deflected by a bend in the gorge called, because of the turbulence of its waters, the "boiling pot." Beyond this the river pursues a tortuous and winding course for about 40 m. through a canyon averaging 600 ft. in width and with basaltic cliffs 400 ft. high. Thence it broadens out again and finally empties into the ocean 1000 m. distant. The falls were named in honor of Queen Victoria by Livingstone, the African explorer, who was the first European to view them. One of the islands on the ledge above the falls is named for the discoverer. The Cape-to-Cairo Railway crosses the gorge on a steel arch bridge just below the falls.

Victoria Nyanza, *Nyahn' zah*, or **Ukerewe**, the largest lake in Africa, situated 450 m. from the Indian Ocean and 175 m. n.e. of Lake Tanganyika. Next to Lake Superior it is the largest body of fresh water on the globe. It is over 200 m. long, has an average breadth of 150 m. and an estimated area of 26,000 sq. m., being nearly as large as Scotland; its surface lies at an elevation of 3775 ft. The islands it contains have an area of about 2300 sq. m.; many of them are wooded, and a few contain small villages; in the others practically only the hippopotamus is found. Crocodiles are also numerous. The lake is one of the chief sources of the Nile. Stanley circumnavigated it in 1875, but it had previously been discovered by Speke in 1858. The Uganda Railway connects with Port Florence, on its eastern coast.

Vicunia, *Vi koon' ya*, or **Vicuña**, an Andean member of the Camel Family much like the llama, but wholly undomesticated. It has a long, slender neck, protruding muzzle and long, pointed ears. Its body is covered with a fine, soft coat of hair, which in color is reddish-brown above and lighter below. This wool is used in the manufacture of a soft cloth rivaling merino in texture. Like the llama, the vicunias travel in herds, with one male leading the flock and guarding it. It is sure-footed and active on the mountain slopes, but as

it has not been very successful in escaping pursuit, it is becoming rare.

Vienna, *Ve en' a*, the capital of Austria and one of the most interesting cities in Europe, situated on the right bank of the Danube River, at the beginning of the Danube plain lying between the Alps and the Carpathians, 330 m. s.e. of Berlin. In population it is the fourth city in Europe. The Viennese are a pleasure- and music-loving people, and the general atmosphere of the city is one of genial gayety. The women dress with a beauty and artistic elegance almost equaling that of the Parisians. Dancing is a favorite pastime, and art and music are extensively cultivated. The city as a whole presents an artistic appearance, because of the unparalleled dignity and splendor of its imposing architecture.

STREETS, SQUARES, PARKS AND MONUMENTS. The Ring-Strasse, a magnificent boulevard, is one of the finest of its kind in the world. It is two miles in length and encloses the inner city, or Vienna proper; on it are the principal public buildings. The smaller streets are narrow and irregular. The principal square, the Rathausplatz, adjoins the Ring-Strasse. Other squares include the Josefsplatz, the Franzensplatz and the Burgplatz. The parks are favorite resorts, especially the Prater, an area of 2000 acres to the east of the city, the Hofgarten, the Volksgarten, the Town Park and those belonging to the châteaux of Laxenburg and Schönbrunn. There is a handsome monument to Francis II, an equestrian bronze statue of Joseph II, the Grillparzer monument, the monument to the Empress Maria Theresa and statues to Prince Eugène of Savoy, Archduke Charles, Schiller, Schubert, Mozart and Beethoven.

PUBLIC BUILDINGS. The Hofburg, or Imperial Palace, is an immense structure, the various styles of architecture of its different parts being suggestive of age and dignity, if not beauty. It contains a library of about 800,000 volumes. The Cathedral of St. Stephen is the most important medieval building. The Im-

perial Opera, built in Renaissance style, vies in architectural beauty and luxurious interior decoration with that of Paris. Other buildings of distinction are various government offices and palaces, the palace of the Archduke Friedrich containing the famous Albertina Library, the Vienna University (See VIENNA, UNIVERSITY OF), the Academy of Sciences, the Renaissance Palace of Archduke Eugène, the Imperial Ministry of Commerce, the Hofburg Theater, the stock exchange, the Rathaus, or Gothic town hall, the natural history and art history museums, the Palace of Justice, the Academy of Art, the Vienna Conservatory of Music, the Polytechnic Institution, the Schwarzenberg Palace, the large general hospital, the arsenal and the municipal asylum. Among the prominent churches are the Augustiner Kirche, the Gothic Augustine Church, the Church of Maria Stiegen, the Gothic Votivkirche, the Karlskirche and the Capuchin Church. The art galleries and churches contain valuable collections of masterpieces by Da Vinci, Rubens, Van Dyck and others. A great number of tenements or flats have been erected, as only a small per cent of the wealthy population live in houses. Some of the Zinspaläste (tenement palaces) are highly adorned and carried out architecturally on a magnificent scale.

COMMERCE AND INDUSTRIES. Vienna is a very important commercial and industrial center, chiefly because of its situation at the crossing of routes from St. Petersburg to Rome, and from London, Berlin and Paris to Constantinople. The entire Danube Canal has been converted into a harbor. The chief manufactured products are musical, scientific and surgical instruments, objects of art, metal wares, fine furniture, pottery, clothing, spirits, books, paper and millinery.

GOVERNMENT AND HISTORY. Vienna was the residence of the Emperor of Austria. It is subject to the Diet and the governor of Lower Austria, and the election of its principal burgomaster is advised by the prime minister and sanc-

tioned by the sovereign. A municipal council, composed of 158 members, is elected for a term of six years. The city was originally the Roman camp of Vindobona. It became the residence of the Babenberg dukes of Austria in the 12th century, since when its importance has rapidly increased. It was occupied by Napoleon in 1805 and 1809, was the seat of the famous Congress of Vienna (See VIENNA, CONGRESS OF), of 1814-15, and the scene of revolutionary riots and bloodshed in 1848. Under Francis Joseph the development was extraordinary. Population 2,149,800.

Vienna, Congress of, a meeting of the delegates of the powers of Europe at Vienna in 1814 to settle the boundaries of the various countries after Napoleon's downfall. The chief countries represented were Austria, Russia, Prussia, England and France, while the minor powers were consulted in regard to affairs involving their interests. Austria received the greater part of the territory she had lost in the Napoleonic wars. The Duchy of Warsaw was made the Kingdom of Poland and given to Russia. Prussia received West Prussia, Posen and the northern part of Saxony, with the greater part of the Rhine provinces and Westphalia. Bavaria was given other territory to offset her losses to Austria and Prussia. The German Empire was organized into a loose confederation of 39 states with Austria dominant. Belgium, Holland and the Luxemburg were united into a kingdom under the Prince of Orange, William I. Sweden retained Norway; and England kept Hanover, Cape Colony, Ceylon and other colonies, and was given a protectorate over the Ionian Islands. The Congress was interrupted by Napoleon's escape from Elba, but its provisions were signed by the participating powers June 9, 1815.

Vienna, University of, an institution of higher education, founded at Vienna in 1365 by Duke Rudolph IV. In 1623 it passed to the control of the Jesuits, who increased the number of buildings and enlarged the scope of the work. It continued its work through the Middle Ages

and was reorganized by Joseph II as a state institution. About the middle of the 19th century important reforms were introduced which have greatly enhanced the prestige of the university. It now maintains faculties of law, political science, theology, philosophy and medicine. The medical department has attained a world-wide reputation and numbers among its students representatives from every civilized country. The library contains over 600,000 volumes besides thousands of pamphlets and manuscripts. The attendance in all departments is about 9,500.

Vikings, sea rovers who came from the north of Europe and scoured the seas of the American continent during the eighth, ninth and tenth centuries. These Scandinavians built excellent ships and could sail the open sea by aid of sun, moon and stars. These men were, in reality, bold, barbarous pirates, but the term *viking* has lost the association of cruelty in modern times and has come to stand for the daring and hardihood displayed by the Northmen, who later established kingdoms and dukedoms in all parts of Europe.

Vilas, William Freeman (1840-1908), an American statesman, born at Chelsea, Vt., and educated at the University of Wisconsin. Later he removed to Albany, N. Y., where he studied law and was admitted to the bar in 1860. From 1862 to 1863 he served in the Union army, attaining the rank of lieutenant-colonel, and he then resumed his law practice at Madison, Wis., from 1868 to 1885 being professor of law in the state university. Meanwhile he served in the State Legislature, in 1884 became permanent chairman of the National Democratic Convention, from 1885 to 1888 was postmaster-general of the United States and the following year served as secretary of the interior. As United States senator he was active from 1891 to 1897, during this period, in 1896, temporarily joining the National (gold) Democratic movement. At one time Vilas was regent of the Wisconsin State University.

Villon, (*Vē'yôn'* or *Vē' lôn'*) **François** (1431-1463?), the first French lyric poet of the modern school, and, it appears, the son of poor folk of Paris. Under the patronage of Guillaume de Villon, from whom, perhaps, he took his pen-name, he became a bachelor of arts in 1449 and a master of arts three years later. Other known details of his life have been found in police records in which Villon figures frequently as a convicted brawler and thief. His subjective verse in the *Petit testament* (1456) and the *Grand testament* (1461) offers a colorful picture of his times and frank sketches of his emotions. He is remembered particularly for his *ballades*.

Vincennes, Vin senz', Ind., a manufacturing, agricultural, and coal-mining center and the county seat of Knox County, 117 miles southwest of Indianapolis, on the Wabash River, on the Baltimore & Ohio, the Pennsylvania, the Big Four, and the Chicago & Eastern Illinois railroads, and on the Dixie Bee Highway and the Lincoln and Midland trails. The chief manufactures are structural steel and bridges, window glass, sewer pipe, shoes, strawboard, corrugated boxes, egg cases, creamery products, agricultural machinery, and flour. Vincennes is the seat of Vincennes University (coeducational, non-sectarian), established in 1806, and of St. Vincent's Orphanage. It was settled and named by French emigrants from Canada. The British occupied the place in 1763. Col. George Rogers Clark captured it for Virginia in 1779 and one hundred years later the federal government appropriated \$1,000,000 for a memorial to be built here in his honor. It was ceded to the United States in 1783 and was the capital of Indiana Territory from 1800 to 1813. It was chartered as a city in 1856. Population, 18,500.

Vin'cent, George Edgar (1864-), son of Bishop John Heyl Vincent, and himself a prominent American educator, lecturer and sociologist. He was born at Rockford, Ill., graduated at Yale in 1885, and, after traveling in Europe and the Orient, became literary editor of the *Chautauqua Press*, vice-principal of the Chautauqua System in 1888, and presi-

dent in 1907. In 1904 he became professor of sociology in the University of Chicago, and later dean of the Junior Colleges and dean of the faculties of arts, literature and science. In 1911 he was elected president of the University of Minnesota, which position he resigned in 1917, to become president of the Rockefeller Foundation. He is author of *Social Mind and Education* and *Introduction to the Study of Society*.

Vincent, John Heyl (1832-1920), an eminent American preacher and lecturer; and since 1878 chancellor of the Chautauqua Literary and Scientific Circle, which he founded in that year. He was also one of the founders, in 1874, of the Chautauqua Assembly. Born at Tuscaloosa, Ala., he passed much of his early life in Pennsylvania; and at the age of 18 began preaching. He subsequently received honorary degrees from various institutions. After serving for some time in the Baltimore Conference of the Methodist Episcopal Church, he held Illinois appointments at Joliet, Mt. Morris, Galena, Rockford, and at Trinity Church, Chicago. He established the *Sunday School Quarterly* in 1865 and the *Sunday School Teacher* a year later. In 1868 he became editor of the Sunday School and tract publications of the Methodist Church, became resident bishop in Europe in 1900, and retired from active service in 1904. He has been college preacher at Harvard, Yale, Cornell, Wellesley and other colleges. His works include *Outline History of England*, *Outline History of Greece*, *The Chautauqua Movement* and *The Modern Sunday School*.

Vincent de Paul, Saint. See LAZARISTS.

Vinci, Veen' chee, Leonardo da (1452-1519), one of the greatest artists of the Italian Renaissance or of any other period, a celebrated sculptor, architect and engineer, a musician and a scientist. He was born at Vinci, in Tuscany, the son of Ser Piero da Vinci, a Florentine lawyer. Carefully brought up, with every advantage of intellectual and artistic environment, the youth at an early age dis-

played a mental alertness and eagerness, an insatiable thirst for knowledge, a charm of personality, an aptitude for all accomplishment that gave promise of brilliant achievement. He was placed under the guidance of the artist Andrea del Verrocchio, from whom he learned modeling and painting. In 1482, having risen to exalted rank as an artist and a scientist, he went to Milan at the invitation of the ruling house, and while there executed a magnificent equestrian statue of the father of Duke Ludovico Sforza, since destroyed, and *The Last Supper*, generally considered his masterpiece, a work remarkable both for external beauty and strength, and for inward and hidden significance, the most perfect representation of that subject in existence. The psychological moment depicted is that immediately following the announcement of Christ that one of the Twelve would betray him.

Leonardo left Milan in 1499, and during the years following he executed a cartoon of the *Battle of Anghiari* and part of the painting, now perished; a cartoon of the *Virgin and St. Anne* (Louvre); the *Madonna of the Rocks* (Louvre); and the portrait of a Neapolitan lady, called the *Mona Lisa*, probably the most famous portrait ever painted, a picture without price, one of the wonders of the High Renaissance. This great painting has long been one of the glories of the Louvre. The last years of the artist's life were spent in France under the patronage of Francis I.

In its subtleties and refinements Leonardo's art is unique. It is the perfect expression of what is of the highest spiritual significance. He handled light and shade with exquisite finesse, and brought to his art such a wealth of scientific knowledge, such insight and fullness of mental power as no other artist has been known to possess. He left few works, for the field of art was only one of the many exploited by his genius, but everything we have, known to be from his hand, is an unrivaled masterpiece.

Vin'egar, a familiar, sour liquid, chemically described as acetic acid

diluted with water, and obtained by fermentation from cider, malt juice, beet-root juice, wine, beer and diluted spirits. Vinegar is used as an appetizer, as a preservative and also to pickle cucumbers, onions, peaches and similar foods. The best vinegar is made from cider, and is known as cider vinegar, the process being one of fermentation. This is sometimes brought about by using a fermenting yeast which turns the sugar into alcohol, which after dilution and further fermentation is converted into vinegar. Pure vinegar is wholesome if not used to excess. Cheap vinegar is made by adulteration, and the housewife should be careful about buying it. Vinegar should be kept in wooden, glass, porcelain or unglazed earthenware vessels and never in metal receptacles, especially in lead, brass or copper ones, as it corrodes these metals and forms dangerous poisons with them. See CIDER; FERMENTATION.

Vi'ol, an ancient musical instrument played with a bow. The viols were precursors of the violin. The number of strings varied from three to six. There were tenor, treble and bass viols, and they were usually played together. Modifications of these are seen in the double bass viol and the violoncello now in use in orchestras.

Vi'olet, a name given to a family of low plants which are widely known and loved. They are common in woods or meadows or rocky hillsides and take equally well to cultivation. The plant is generally stemless, with leaf and flower stems proceeding directly from the root. The flowers are irregular in form, having two broad petals above, two narrower but generally longer ones at the side, and a lower one with a short, rounding spur. The slender flower stem has a curve near its top which causes the flower to hang "face down," thus earning its name of *modest violet*. The color of the flowers varies from the true violet shade to light blue, yellow and white.

The typical violet has wavy-margined, dark green leaves, rounding at the base, but pointed at the apex. The bird-foot

violet has, however, narrowly-divided leaves resembling a bird's claws. This species has large, pale blue, seldom white flowers, the upper petals rather darker than the lower, which are marked with darker lines. They are found in shady soil throughout the United States. The hand-leaf violet has broader, three- to seven-parted leaves, and is more common southward. The round-leaved, yellow violet occurs commonly only in dark woods of the farther North, but there are two other yellow violets, the downy and the halberd-leaved, which are found in rich woods in the West and South. The dog violet and the Canada violet have more pansylike, leafy stems and are somewhat taller than the other species.

Violets are in bloom from April till July, and in many localities are found in great profusion, meadows and woodlands being carpeted blue with the blossoms. The English violet, which is the most commonly cultivated species, is very fragrant. The rounding leaves are dark green in color, and the flowers, which are often very double, are the true violet shade. The violet is the state flower of Illinois, Rhode Island and Wisconsin.

The dogtooth violet is really not a violet but a lily, and is more appropriately designated by its other name, adder's tongue.

Vi'olin', a stringed musical instrument played with a bow. The most essential parts are the scroll, or head, in which are placed the keys for tightening the strings; the neck, which connects the scroll with the body and to which the finger board is attached; the body, consisting of the belly over which the strings are stretched; the back, or underpart; the ribs, or sides, which unite the back and belly; the tailpiece, to which the strings are attached; the strings, four in number; and the bridge, over which the strings are stretched. The strings are of catgut and the lowest is wound with copper or silver wire. The strings are tuned at G, D, A and E, reckoning upward.

The violin is considered the most perfect musical instrument because it can produce all tones in any scale and these

VIPER

in perfect tune. The manufacture of violins is a fine art, which seems to have reached its highest degree of perfection with Stradivari in the 17th century. Perfect violins of this make are now rare, and by celebrated players are considered almost priceless.

Vi'per, a large family of venomous serpents, characterized by having their long fangs fastened upon movable bones so that they may be folded flat against the roof of the mouth when the jaws are closed. There are two prime divisions: the true vipers, found only in the Old World; and the pit vipers, found in both the Old and New worlds, and recognized by having two small pits or depressions upon the head, between the eyes and nostrils. All but two of the poisonous serpents of America belong to this latter class. The vipers have long, needle-pointed fangs through an opening in which the poison is ejected. Their heads are heart-shaped, their bodies slender and tapering. Some lay eggs, but the majority have their young born alive. The vipers lie flat when attacked, and show their anger by glaring, hissing and striking ferociously. Their principal food is mice and frogs. The horned viper is sometimes called the asp.

Virchow, *Vur' chou*, **Rudolf** (1821-1902), a German pathologist and anthropologist, born at Schivelbein, Prussia. He was graduated from the University of Berlin in 1843, and after completing his medical studies four years later, became lecturer in anatomy in that institution. Virchow distinguished himself as a pathologist and as a reformer and political leader. He executed numerous government commissions in the cause of health, and during the wars of 1866 and 1870-71 devoted himself to training hospital corps. In 1880 he was elected to the Reichstag. The Pathological Institute and Museum, erected at Berlin by the government in accordance with Virchow's wishes, is the greatest institution of its kind in the world. Among Virchow's voluminous writings are *Cellular Pathology*, his most important work; *Lectures on Life and Illness*, *Treatise on*

VIREO FAMILY

the Theory of Trichinæ and Lectures on Pathology.

Vir'eo Family. The vireos are peculiar to America, the greatest number of species being found in the tropics. They are very active birds, usually seen rather high up in the trees. These birds feed chiefly upon insects, though to some extent on fruits and berries. The bill is wide, flat and hooked at the end for holding insects. The sexes are alike in color.



RED-EYED VIREO

The nests are hung from forked twigs, are cup-shaped and are placed from 4 to 45 ft. from the ground. The nests vary in appearance, some being beautiful examples of architecture, while others are rather roughly made. The materials used consist of coarse grass, spiders' webs, lichens, plant fibers and hair. Three to five speckled eggs are laid by the species living in the temperate zone, and it is thought that two broods are raised annually. Of the 70 known species, four are common and well known in eastern America.

RED-EYED VIREO. This bird is common throughout the United States. The body is bright olive above and white, faintly tinged with olive, below. The crown is ashy gray with a white line over the eyes. The wings are dark gray and the iris is red, from which circumstance the bird takes its name. The length is from five and one-half to six and one-half inches. The red-eyed vireo is found in forests or tall trees near gardens, where its song may be heard throughout the day, since it sings almost continually when hopping in search of food.

WHITE-EYED VIREO. This bird is about five inches long. The body is olive above, shading into gray on the back of the neck and wings, and white below. The sides are shaded with yellow, the wings and tail are dark gray and the wings have yellow bars. The iris in the adult is white and this gives the bird its name. This vireo prefers low, swampy ground covered with blackberry vines or briers. The birds feed in silence, but when satisfied they mount the top of a bush and send forth numberless calls and whistles.

WARBLING VIREO. The warbling vireos are found about houses, in villages and even in the heart of large cities, where they nest in shade trees. The body is olive-green above, shading to gray on the head, and buff-white below. The flanks and sides are tinged with olive-yellow. The song is unusually sweet and tender, surpassing the most delicate notes of the flute.

YELLOW-THROATED VIREO. This vireo is readily distinguished by its greenish back and neck, yellow under parts, yellow line over the eye and two white wing bars.

Virgil, Vur' jil. See VERGIL.

Virginia, Ver jin' i a, THE OLD DOMINION, the most northerly of the South Atlantic States, is bounded on the n. by Maryland, on the e. by the Atlantic Ocean, on the s. by North Carolina and Tennessee and on the n.w. by West Virginia. The state has the form of an irregular triangle, with the southern boundary for its longest side.

SIZE. The greatest length from east to west is 425 m. and the greatest breadth is 200 m. The area is 42,627 sq. m., of which 2365 sq. m. are water. Virginia is a little larger than Ohio or Kentucky, about one-third the size of New Mexico and the 33rd state in size in the Union. The coast line, including Chesapeake Bay, is a little over 1400 m.

POPULATION. In 1920 the population was 2,309,187; from 1910 to 1920 the gain was 247,575, or 12 per cent. There are 57.4 inhabitants to the square mile. The state ranks 20th as to population.

SURFACE. Virginia is divided into three surface regions, or sections. The first includes the lowland in the eastern part of the state, which is a portion of the great Atlantic Coastal Plain. This region has an area of about 11,000 sq. m. It is a tidewater region, and the coast is indented by numerous inlets, the largest being the estuaries of the Potomac, York, Rappahannock and James rivers. Most of the land is low, and it gradually rises from sea level on the coast to an altitude of 300 ft. in the west.

West of the Coastal Plain is the Plateau Region, or Piedmont Section. This lies between the Coastal Plain and the mountains and occupies about 18,000 sq. m. On the east the altitude ranges from 150 to 300 ft., and on the west it is from 700 to 1200 ft., where the plateau rises to meet the foothills of the Blue Ridge Mountains. Most of the surface is rolling, and there is an occasional outcropping of rock, forming high ridges.

West of the Piedmont Section are the Blue Ridge Mountains, which divide this section from the great Valley Province occupying the western part of the state. The Blue Ridge Mountains forming this eastern boundary have elevations varying from 1460 ft. at Harper's Ferry to 5719 ft. on White Mountain in Grayson County. West of the Blue Ridge Mountains are a number of parallel ranges of the Alleghenies, all having a southwesterly trend. These ranges are separated by broad valleys, the most conspicuous of them being the Valley of Virginia, through which flows the Shenandoah

River. The other valleys of note are those of the Roanoke, James, New and Holston rivers. In the southwest corner of the state these ranges unite to form the massive mountain groups of eastern Tennessee.

RIVERS AND LAKES. The Potomac with its tributaries, the North Branch, the South Branch and the Shenandoah, drains the northern part of the state and the northern portions of the valleys in the mountain regions. Flowing into Chesapeake Bay are the Rappahannock, the York and the James. The Appomattox and Nottoway drain the south-central part of the state and unite in North Carolina. The Roanoke flows for a long distance through the south-central part of the state and then returns to North Carolina. The New and the Holston drain a part of the western portion of the state into the Ohio.

There are no inland lakes, but along the coast are numerous marshes. The largest of these, known as Dismal Swamp, is in the southeastern part of the state and has an area of 700 sq. m. In the center of this is Lake Drummond, a body of fresh water about two miles in diameter.

SCENERY. The uplands and mountains are diversified by hills and valleys, and by many rapid streams. The Natural Bridge in Rockbridge County, and the Luray Caverns in Page County are natural attractions of world-wide interest. Throughout the limestone region are castle-shaped rocks, isolated columns and other fantastic forms common to limestone formations.

CLIMATE. The climate of Virginia is free from extremes of heat and cold, and is pleasant and healthful. In the west the mountains protect the valleys from the cold north winds, and in the east the heat is reduced by sea breezes. The annual rainfall is from 40 to 45 inches, and is evenly distributed throughout the year.

MINERALS AND MINING. Coal and iron ore are found in large quantities and are the most valuable minerals in the state. The most extensive coal

measures are in the southwest. The famous Pocahontas coal is taken from mines in Tazewell County. The most extensive deposits of iron are in the foothills of the Blue Ridge and other ranges of the Alleghenies. About 700,000 tons of iron ore and 10,396,000 tons of coal are mined yearly. There are valuable manganese mines in the Shenandoah Valley. The state leads the country in the production of soapstone, and gypsum, cement and salt are produced in paying quantities. Virginia is a leading state in the Union in the number of its mineral springs, and mineral waters are an important product. Some of the springs are noted for their medicinal properties.

FORESTS AND LUMBER. White pine, hemlock and some hard woods are found in the mountainous regions. In the Piedmont Section, oak is found, and on the lowlands are forests of yellow pine. Much of the merchantable timber has been cut, but the output of lumber continues to increase, and lumbering is one of the important industries of the state, the annual production amounting to about \$12,000,000.

AGRICULTURE. Agriculture engages the attention of a large majority of the inhabitants and is by far the most important industry.

Soil. In the tidewater section the soil is a chocolate clay, except along the rivers and creeks, where the soil is a dark loam. There is much marsh land, which when drained is very productive, as shown by the parts of the Dismal Swamp which have been reclaimed. In the Piedmont Section the soil is very rich, and more productive, generally, than that in the lowlands. The high elevations have a light, sandy soil, and the great valleys have deep deposits of alluvium, which gives them a high degree of fertility.

Products. Corn is the most important crop, followed in their order by wheat, oats, rye and buckwheat. Large quantities of hay are raised and tobacco is extensively cultivated in Pittsylvania, Halifax and Mecklenburg counties. Virginia is the oldest state in the production

of tobacco and now ranks third among the states engaged in this industry. In early colonial days tobacco was the currency and was legal tender for debts. Large quantities of peanuts are grown in the lowlands, and Norfolk is the largest peanut market in the world. Garden truck is raised to supply the markets in near-by cities. Cotton is grown in a few counties, the crop amounting to about 26,000 bales a year.

Horses, cattle, mules, swine and sheep are profitable and are raised for market in nearly all parts of the state. Dairying is an important branch of agriculture in Virginia, and the income from poultry and eggs is also considerable, equaling that derived from dairy products.

FISHERIES. Oyster farming is carried on at various points on Chesapeake Bay and the rivers and creeks in Tidewater Virginia, which have large areas remarkably well suited for oyster beds. Shad, menhaden, clams, alewives and other fish are also caught in large quantities.

MANUFACTURES. Wherever the streams descend from the Piedmont Section to the lowlands, excellent mill sites are found. At Richmond, Petersburg, Fredericksburg and other cities this water power has been developed, and these towns contain a number of thriving manufactories. The manufacture of tobacco products leads in value and amounts to about \$17,000,000 a year. The manufacture of cotton and woolen goods is rapidly increasing. Other manufactures include flour and gristmill products, machinery and railway cars. In the tidewater region preparing peanuts for the market furnishes employment to a goodly number of people.

TRANSPORTATION AND COMMERCE. On the shores of Chesapeake Bay are numerous good harbors, and Hampton Roads affords probably the largest anchorage on the Atlantic coast. Regular lines of steamers ply between Norfolk and New York and Boston, and Savannah and other ports to the south. The lower courses of most of the rivers flowing into Chesapeake Bay are navigable as far as the Fall Line. Numerous lines

of steamers ply regularly between the river ports and other ports on the bay. Railways traverse the state in all directions, and all sections are in easy reach of railway facilities. The chief systems are the Atlantic Coast Line, the Seaboard Air Line, the Baltimore & Ohio, the Chesapeake & Ohio and the New York, Philadelphia & Norfolk. Petersburg, Roanoke, Richmond and Lynchburg are important railway centers.

A thriving trade is carried on with commercial centers outside the state. The chief exports are coal, agricultural produce, live stock, dairy products, poultry and eggs. The imports consist of manufactured articles and foodstuffs that cannot be grown profitably within the state.

GOVERNMENT. The present constitution was adopted in 1902, and is the sixth in the history of the state. The governor, lieutenant-governor, attorney-general, secretary of the commonwealth, treasurer, superintendent of public instruction and commissioner of agriculture are elected for a term of four years. Each new administration begins on the first day of February. Other state executive officers and members of state boards are appointed by the governor and confirmed by the Senate. The Legislature consists of a Senate and a House of Delegates. The number of senators cannot be more than 40 or less than 33, the number of delegates, not less than 90 or more than 100. Senators are elected for four years, and delegates for two. The Legislature meets biennially, and the length of the regular session is limited to 60 days, but may be extended by a vote of three-fifths of the members of each house, although such extension cannot exceed 30 days.

The state judiciary consists of a Supreme Court of Appeals, Circuit Courts, City Courts and courts of the justices of the peace. The Supreme Court of Appeals consists of five judges chosen by the Senate and House of Delegates for 12 years. Any three judges may hold court. One Circuit Court is provided for each of the 30 districts into which

the state is divided. A judge for each circuit is chosen by the Senate and House of Delegates for a term of eight years. Cities of 10,000 or more inhabitants have City Courts, which in rank and authority are the same as the Circuit Courts. Local courts are presided over by justices of the peace.

For the administration of local affairs counties are divided into magisterial districts, and each district has a supervisor elected for a term of four years. The supervisors of these districts constitute a county board, and this board has charge of the business affairs of the county, and levies county taxes. Laws safeguarding married women, the rights of property and the welfare of children are complete and strict. Children under 14 are not allowed to work in factories, shops, mercantile establishments or mines unless dependent upon their own labor for self-support or for the support of younger children or invalids.

EDUCATION. The public school system of the state is administered by a superintendent of public instruction and a state board of education. Each county has its own board and superintendent of public instruction, and each district has its district board. The state board of education prescribes the duties of the superintendent of public instruction, fixes the boundaries of school divisions, selects textbooks, provides for the examinations of teachers and appoints school inspectors. Separate schools are maintained for white and colored children. The school fund is derived from interest on the literary fund, the state poll tax and state and local property taxes. In 1908 provision was made for the establishment of departments of agriculture, domestic economy and manual training in at least one high school in each congressional district. In 1910 a law providing aid for rural graded schools was enacted. All children between the ages of 8 and 12 are required to attend either public or private schools for at least 12 weeks in the year, unless excused for physical disability or unless living so far from school or a school

road as to make attendance impracticable.

A number of high schools maintain normal training departments. There are state normal schools at Radford, Farmville, Harrisonburg and Fredericksburg. The Virginia Normal and Industrial Institute is at Petersburg, and the Agricultural and Mechanical College at Blacksburg. The Virginia Military Institute is at Lexington; the University of Virginia is at Charlottesville; and the College of William and Mary, which is a state institution, is at Williamsburg. Institutions of higher learning not under the control of the state are Washington and Lee University at Lexington; Hampden-Sidney College; Richmond College; Randolph-Macon College at Lynchburg; Emory and Henry College at Emory; Roanoke and Elizabeth Colleges at Salem; Bridgewater College at Bridgewater; Northampton College and Virginia Union University at Richmond; and Virginia Christian College at Lynchburg.

STATE INSTITUTIONS. There are four state hospitals for the insane located respectively at Williamsburg, Marion, Staunton and Petersburg. The school for white deaf and blind children is at Staunton, and that for colored persons is at Newport News. The state penitentiary is at Richmond. The Prison Association of Virginia maintains an industrial school at Laurel Station, and the Negro Reformatory Association of Virginia maintains a manual labor school at Hanover. There is also a Virginia Home and Industrial School for white girls at Bon Air.

CITIES. The chief cities are Richmond, the capital; Norfolk, Newport News, Petersburg, Lynchburg, Portsmouth, Roanoke, Staunton and Danville.

HISTORY. Virginia, named after herself by the Virgin Queen Elizabeth, was probably visited by Sebastian Cabot in 1498. Late in the following century Sir Walter Raleigh attempted settlements. In 1606 the London Company sent over colonists, who, led by John Smith, established Jamestown in 1607.

Of the 500 immigrants who came later, but 60 were alive when, in 1610, Lord Delaware arrived, as governor, with reinforcements. His wise administrative policy brought prosperity. In 1619 the Dutch introduced negro slavery. The same year the first elective assembly of America met at Jamestown, and 1200 additional colonists landed. In 1624 Virginia became a royal colony. During the next 50 years Puritans and Royalists flocked to Virginia, where a growing discontent with religious, administrative and economic conditions culminated in 1676, in Bacon's Rebellion (See BACON'S REBELLION).

From the time of the French and Indian War, Virginia took exceptional prominence. It united the colonies against the Stamp Act. It rallied them against the subsequent measures to raise taxes without their consent. It proposed to Congress the Declaration of Independence. It furnished such leaders as Washington, Jefferson, Patrick Henry and Madison. The surrender of Cornwallis occurred at Yorktown. Though Virginia was finally states' rights for years (See KENTUCKY AND VIRGINIA RESOLUTIONS), eight of the first nine presidential terms were filled by Virginians. Until 1820 it was the most populous state in the Union.

Though at first favoring emancipation, agricultural conditions turned Virginia towards the South, and the state seceded in April, 1861. As it was the chief battleground of the Civil War, it suffered more than any other state. Virginia ratified a new constitution abolishing slavery in 1869, and the following year it entered the Union. Since the Reconstruction Period the state has been prosperous. Consult Cooke, *Virginia*.

Virgin Islands, an island group of West Indies, lying east of Porto Rico and comprising about 35 islands. They are of volcanic origin, but the soil is generally fertile and the climate is similar to that of Porto Rico. Among the principal productions are sugar, salt, ginger, molasses, rum, cotton, turmeric, and many varieties of fruit. Saint Thomas,

Saint Croix, and Saint John are the most important. These islands formerly belonged to Denmark. Virgin Gorda, Anegada, and Tortola, being British, are governed from the colony of the Leeward Islands. Roadtown, on the south side of Tortola, is the capital and seat of local government. The British possessions have an area of 55 square miles and a population of 5,612. Columbus discovered the group, in 1494, and Tortola has been British since 1666. The entire group has an area of 270 square miles and a population of 43,688.

Virgin Islands, American. The Islands of St. Croix, St. Thomas, and St. John, in the Virgin group of the Lesser Antilles, were purchased from Denmark, and taken possession of by the United States on March 31, 1917. The islands lie about 50 miles from Porto Rico; area, 142 square miles; population, 26,051. St. Croix is the largest, richest, and most populous of the three islands; it has much rich sugar land. St. Thomas is declared by naval officers to possess advantages enabling it to be converted into a second Gibraltar. St. John, the smallest of the three islands, is of economic importance, for it is from here that come the leaves of the bay tree, from which bay rum is prepared. Most of the bay rum is made in St. Thomas. The islands have a variety of vegetation.

Virginia, Minn., a city of St. Louis Co., 75 m. n.w. of Duluth, on the Great Northern, the Duluth, Missabe & Northern, the Duluth & Iron Range, the Duluth, Rainy Lake & Winnipeg and other railroads. The town is engaged chiefly in iron mining. It contains flour mills and a brewery. A Carnegie library is among the features of interest. Virginia was settled and incorporated in 1892 and the following year was destroyed by fire. In 1900 fire again caused heavy losses. Population in 1920, 14,022; estimated, 1925, 16,030.

Virginia Creeper, an ornamental climbing shrub of the Vine Family, native in the United States and frequently cultivated as a porch-climber.

The stem is woody and rough, and from it are produced many branched tendrils, upon the ends of which are flat disks or suckers by which the plant pulls itself up walls or trees. In one variety these suckers are produced only when they come in contact with a flat surface. In other varieties the tendrils are in the form of knots. The leaves are generally made up of five leaflets which spread like the fingers from the palm of the hand. In the autumn these leaves take on a vivid coloring of scarlet and crimson, which makes them unusually attractive and noticeable. The flowers are small, inconspicuous and green in color. They grow in a loose cluster and the petals of each individual blossom spread wide before they fall. The fruit is a seedy berry, which is black or blue-black in color. The number of its leaflets is the distinguishing difference between this plant and the poison ivy, the latter having only three leaflets.

Virginia Nightingale. See CARDINAL.

Virginia Rail. See RAIL FAMILY, subhead *Virginia Rail*.

Virginia Resolutions. See KENTUCKY AND VIRGINIA RESOLUTIONS.

Virginia, University of, at Charlottesville (1819). This is an undenominational institution four miles from Monticello, the home of Thomas Jefferson, its founder. It was opened in 1825. The college buildings, planned by Jefferson and erected under his supervision, form a notable group, with the Rotunda as the dominant structure. This building, now devoted to the university library, was modeled from the Roman Pantheon. The university offers instruction in the academic, engineering, law, and medical departments; the academic courses are purely elective.

Virgin's Bower. See CLEMATIS.

Virgo, *Vur' go*, the sixth of the 12 constellations of the zodiac. The sign Virgo was named from the maidens who gleaned in the harvest, and is supposed to represent a maiden with folded wings holding an ear of corn. The sun enters

this sign about the last of August. On account of the precession of the equinoxes this sign is now in the constellation Leo. The principal star, Spica, which is of the first magnitude, is used in determining longitude at sea. See STARS; CONSTELLATIONS; ZODIAC.

Vish'nu, the second person in the Hindu Triad, Brahma, Vishnu and Siva. He is the Preserver. He is represented in painting and statuary with four hands, each holding a symbolic object, and he is often represented as riding upon a creature half man and half bird.

Visigoths, *Viz' i goths*. See GOTHs.

Vis'tula, the principal river of Poland, rising in the western part of Galicia on the northern flanks of the Carpathian Mountains, flowing first n.e. then n.w. and emptying into the Baltic Sea at Dantzig, thus traversing the heart of Poland. See POLAND.

Vi'tam ines, substances of unknown chemical constituents that exist in excessively minute quantities in animal and vegetable foods. They have never been isolated and we know them only by their effects. The processes of growth and nutrition, and even life itself,—all life, vegetable and animal—depend on the presence of these microscopic organisms existing in almost infinitesimal quantities. Three varieties have been studied. We know the effects they cause, and the special diseases to which their absence gives rise. The first is called the fat-soluble-A, because it is found in butter-fats, the fat of yolk of eggs, cod-liver oil, etc. Its deficiency is one of the contributory causes of rickets, hence it is known as the antirachitic vitamine. The second one is called the water-soluble-B, because it can be extracted from food by water or alcohol. It exists in wheat, many fruits, the pericarp of rice, etc. Its deficiency in a diet causes beriberi; hence it is known as the antineuritic vitamine. The third is called water-soluble-C. It is found in fruit juices, fresh vegetables, etc. Its deficiency causes scurvy; hence it is known as the antiscorbutic vitamine. See HEALTH DEPARTMENT STUDY GUIDES.

Vitriol, *Vit'riul*, a name used by early chemists and still used as the common name for ordinary commercial sulphuric acid (oil of vitriol), copper sulphate (blue vitriol) iron sulphate (green vitriol), sulphate of zinc (white vitriol), and cobalt sulphate (red vitriol). Aromatic sulphuric acid is known in medicine as elixir of vitriol. See COPPERAS.

Viv'isec'tion, the dissection of the animal body for the purpose of discovering some fact of anatomy or pathology, or for demonstrating known facts to students. Although the term is in strictness applied only to operations which involve cutting, it is regularly employed with reference to all scientific experimentation with living animals, whether such experiment involves the inoculation of disease or the administration of drugs and poisons. There has been great opposition to the practice in various countries, particularly in the United States, on the ground of cruelty to animals. At the present time humanitarian methods are employed in laboratories, and all unnecessary pain of the subject is eliminated.

Vladivostok, *Vla" dye vas tauk'*, a seaport of Russia on the Pacific Ocean, capital of the Maritime Province of Siberia, situated on the Peter the Great Gulf. It is an important naval station and commercial center, is strongly fortified, and forms the eastern terminus of the Trans-Siberian Railway. The surrounding hills yield a rich timber supply. The public buildings are handsome, and several professional schools, an Oriental institute, a naval hospital and naval and mechanical works are maintained. The harbor is spacious and safe, and is free from ice nine months of the year. The Chinese practically control the commerce; the exports are principally raw materials. Vladivostok was founded in 1860-61. Population, about 100,000.

Voice, sounds produced by the vibrations of the vocal chords (See LARYNX). The vocal chords may be compared to the head of a drum, the membrane of which has been slit across the middle, leaving an opening through

which the air passes. They are controlled by a series of muscles by means of which they can be contracted or relaxed. During ordinary breathing the chords are relaxed and the opening takes the form of a triangle; but when the chords are made to contract, the opening is narrowed, and air then driven through it causes the edges to vibrate, thus producing sound. The force with which the air is pressed through determines the volume of sound; the tension of the chords determines its pitch. The tighter the chords, the more rapid the vibrations and the higher the pitch. The normal pitch of a voice depends upon the size of the larynx. If this organ be small the vocal chords are short and the voice high-pitched. For this reason women's voices are higher-pitched than men's, and children's higher still.

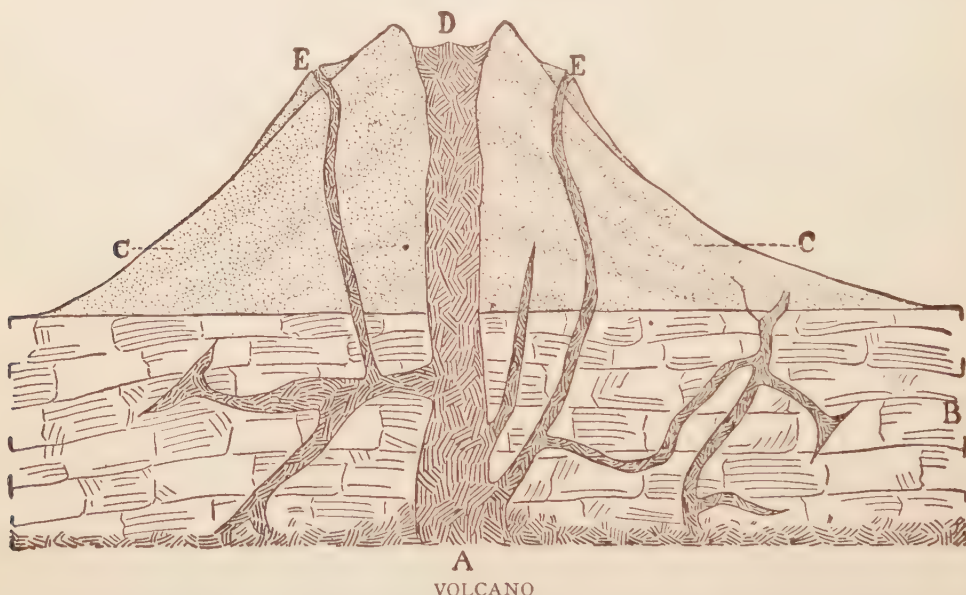
By range, or compass, of a voice is meant the scale of tones between the lowest and the highest note which it is capable of producing. The average human voice has a range of three octaves. Men's voices are bass and tenor; women's are higher in the scale and are contralto and soprano. The voice is modified by the mouth cavity, tongue, teeth, palate, lips and by a large number of delicate adjustments which affect its quality, strength and pitch, and by whose coordination the mechanical process involved in speech is possible.

Volca'no, a mountain which has periods of activity, during which it emits molten material, ashes, cinders, lava, steam, mud and various gases. The fundamental parts of a volcano are the base, B; the cone, C, C; the basin-shaped depression at the summit, known as the crater, D; and the opening from the crater to the subterranean source of activity, called the vent, or chimney, A. E, E are smaller vents. Volcanoes vary considerably in size, ranging from 4000 ft. to the great peaks 17,000 ft. and more in height. The magnitude of a mountain is in no way an indication of the force of its volcanic activity. In fact, the smallest are usually the most violent. It is probable that the greater

number of volcanoes have built themselves up with continued emission of their ejected products. The shape of a volcano, therefore, depends largely upon the quality of the material thrown out. If the ejected mass be ashes and thick lava, the mountain will be steep and of considerable height, as Vesuvius; if, on the contrary, the lava be thin and freely flowing, the mountain will be low, with gently sloping sides, such as the volcanoes of Hawaii. In the latter the

by the Mississippi in the course of an entire year. So great is the force with which the volcanic material is thrown out that the lighter dust particles rise many miles into the air, where they are held in suspension sometimes for months, or perhaps years, and move about with the upper atmospheric currents, often giving rise to beautiful red glows.

The cause of volcanic action is not fully understood. The view generally accepted is that internal heat generates



eruption usually comes from one or more vents in the sides of the mountain.

Volcanoes may be active, dormant or extinct. Active volcanoes are those that are either frequently or continuously in eruption; dormant volcanoes are those that have long periods of inactivity; and extinct, those that have ceased altogether to be active. The quantity of material thrown out in the course of an eruption depends upon the force of the underground disturbance. In the eruption of Skaptar Jökull in 1783, the mass of lava ejected is estimated to have equaled the bulk of Mont Blanc; while the material ejected from Mont Pelée in 1902 is said to have been equal in bulk to the amount of sediment carried off

gases, which rush about through underground caverns seeking an outlet. This explains the rumblings and earthquakes that usually precede the eruption. When the pressure of vapors becomes intense, the eruption takes place at that part of the earth's crust which is thinnest and, therefore, least resistant. Besides earthquakes, the upheaval is usually preceded by such warnings as the drying up of springs and increased temperature of the region. The following are the most disastrous eruptions of history: that of Vesuvius in 79 A. D., that of Krakatao in 1883, and that of Mont Pelée in 1902. In the eruption of Mont Pelée over 30,000 persons lost their lives within a few hours. See VESUVIUS; ETNA.

Vole, a name applied in Europe to various species of field and meadow mice. All have soft-coated, plump bodies, sharp faces and long, hairless tails. They commonly live in moist meadows, although one species, the water vole, is more aquatic in its habits. The voles make their nests in burrows and feed upon grains, grasses and tender leaves.

Vol'ga, the largest river of Russia and of the whole of Europe. It rises among the Valdai Hills in the Government of Tver, flows in an irregular southeast course and empties into the Caspian Sea. It receives the Kama, the Oka and other rivers. Its course is about 2300 m., and it is navigable the entire length except the first 300 m. The large amount of sediment which it carries causes the formation of immense sand bars, and a constant system of dredging is operated for their removal. The enormous traffic, about 14,000,000 tons annually, is stopped by ice one-third of the year. Among the ports on its banks are Astrakhan, Nizhni-Novgorod, Tsaritsyn and Saratov. Canals connect it with the White, the Baltic and the Black seas.

Volt, *Volte*, the practical unit of electrical potential difference. It is that potential difference which, steadily applied to the terminals of a conductor whose resistance is one international ohm, will produce a current of one international ampere. For testing purposes standard cells are made and sent to the Federal Bureau of Standards at Washington, D. C., where they are tried and certified as having a definite electromotive force on open circuit. The most-used cell of this type at the present time is the Weston cell, which has an electromotive force of from 1.0183 to 1.0187 volts. See ELECTRIC POTENTIAL; ELECTRIC BATTERY.

Volta'ic Battery. See ELECTRIC BATTERY.

Voltaic Cell. See VOLTAIC PILE; ELECTRIC BATTERY.

Voltaic Pile. A simple *voltaic cell* consists of a strip of copper and a strip of zinc dipping into dilute sulphuric acid. The electrical potential difference

between the free ends of the copper and zinc is about one volt. If several such cells be joined in series (the zinc of one cell joined to the copper of the next and so on), the potential difference between the first copper and the last zinc is increased in proportion to the number of cells joined in series. The voltaic pile consists essentially of a series of simple voltaic cells, except that the dilute sulphuric acid is replaced by disks of cloth or paper saturated with an acid or a salt solution. The pile thus consists of a pile of disks arranged in order as follows: copper, cloth, zinc, copper, cloth, zinc and so on. The potential difference between the first copper and the last zinc disk can easily be made several hundred volts. Such a pile is sometimes used in experimental work when a considerable potential difference is desired, but no appreciable current is required to be drawn from the pile. See ELECTRIC BATTERY.

Voltaire, *Vol' tair'*, the assumed name of Jean François Marie Arouet (1694-1778), a noted French philosopher and writer, born in Paris. He came from a good family of the middle class, and was educated partly by his father and partly by the Jesuits. His father wished him to study law, which he professedly did for a time, but his interests were all in the direction of a literary career. He soon became known as one of the most brilliant and sarcastic wits of the day. He always had the courage to stand by his convictions, and fearlessly attacked what he considered the follies of society and inconsistencies in government policies. His caustic writings often got him into trouble, and once he was imprisoned in the Bastille for 11 months (1717-18). Here he completed the tragedy *Ædipus*, which was published and put on the stage soon after his release, and brought him immediate fame. He now assumed the name Voltaire, the origin of which is uncertain. From this time until his death, a period of 60 years, he was an indefatigable writer on the most varied subjects.

For eight years he resided chiefly in Paris, living a life of pleasure in the

gayest society, and occupied with the production of plays and poems. He then went to England in 1726, where he remained for over two years, forming the acquaintance of the noted literary men of the day and familiarizing himself with English thought. This sojourn in England greatly influenced his later literary activity. Returning to Paris, he remained there until 1732, raising himself to opulent circumstances.

In 1750 Voltaire went to Prussia for three years at the invitation of Frederick the Great. A quarrel with Frederick led to his leaving Prussia, and in 1754 he repaired to Geneva and bought a small estate, where he remained until 1758, when he purchased large feudal estates at Ferney, on the shore of the lake near the boundary of Geneva. Here he lived for the remaining 20 years of his life, recognized throughout Europe as one of the foremost men of the day, and receiving a constant stream of noted visitors.

Voltaire was one of the most prolific writers who ever lived. His works were characterized less by profundity of thought and accurate scholarship than by versatility, breadth of range, acuteness of criticism and clearness and trenchancy of style. Aside from his more extended writings he published a continuous succession of pamphlets against current abuses in social and religious life. Indeed, some of his works are little read today because they so thoroughly accomplished their purpose of reformation that the life which they depicted now seems far removed from modern interests. His criticisms exercised a profound influence in bringing on the crisis of the French Revolution and putting an end to the old regime.

Among the productions on which his literary fame rests may be mentioned his voluminous correspondence, his dramatic works, his satires and light poems, all exhibiting wit, vivacity and grace; his longer poems, *La Henriade* and *Pucelle*; his romances, of which *Candide* and *Zadig* are the best examples; his historical works, chief among which are *The Age of Louis XIV* and *The History*

of *Charles XII*; and his philosophical writings collected in his *Dictionary of Philosophy*.

Voltmeter, *Volte' me" ter*. See ELECTRIC METER.

Vol"unteers' of America, an organization for religious work in America, formed in 1896, at New York City. It was founded by Commander Ballington Booth and wife, formerly of the Salvation Army, who withdrew from the latter organization because of their disapproval of certain of General Booth's orders. The general aims and methods of the Salvation Army prevail, with certain modifications, and the organization is modeled on that of the United States army. The sacraments of baptism and communion are observed. In 1911 the Volunteers reported about 36 homes and institutions of benevolence, the Volunteer Hospital of New York City, a Volunteer Prisoners' League, having some 75,000 members, and various other philanthropic enterprises. In that year their workers called upon and aided over 26,000 families and distributed over 400,000 free meals. Through the Fresh Air Branch of their work they see that mothers and children of the poorer districts are sent to the country for rest and recreation. Reading rooms are maintained and Christian literature is distributed widely throughout prisons, jails, soldiers' homes, etc. These various activities are means to the great end of the organization, the conversion of men and women. The *Volunteers' Gazette* is published weekly in New York, where are located the headquarters of the Volunteers. See SALVATION ARMY.

Vom'iting, the ejecting of the contents of the stomach out of the mouth. It is preceded by nausea and accompanied by headache and, usually, by perspiration. The contents of the stomach are thrown up by contractions of the muscles of the stomach and abdomen. Relief may be obtained by lying on the back and by mild stimulants. A time-honored household remedy is the mustard plaster placed over the stomach. Vomiting is a symptom of many diseases,

but may occur in otherwise good health from poisoning, overeating, or disturbances to equilibrium, as in seasickness.

Von Hindenburg, Paul (1847-), second president of the German Republic at the age of 78, military strategist, and commander in chief of the Central Powers during the World War, was born in Posen, son of a Prussian officer. His life was spent in the army; he served against Austria and France, and was an officer of von Schlieffen's staff. He retired in 1907, but in 1914 was recalled and sent to halt the Russian advances. His brilliant victories in East Prussia led to the command of the German armies, in which he made a remarkable record. (See *WORLD WAR*, pp. 4092 ff.)

He retired after the war, but in 1925 was induced unwillingly to enter the presidential campaign, and was elected. His early record led to apprehension on the part of foreign powers, but his administration upheld faithfully the republican constitution. He is the idol of his people, the typical German, strong of will, steadfast in adversity, resolute, and cool-headed.

Vor"ticel'la, a genus of Infusoria, a low division of the animal kingdom. Vorticella are tiny bell-like marine animals, fixed flower-like on long stalks. They bear about their wide mouths fringes of minute waving cilia, hair-like processes which create a current of water and carry into their bodies the microscopic organisms on which they live. Some species are protected by horny coverings; others are soft-bodied. The stalks are hollow, but contain muscles that draw in the cilia on alarm and coil and stalks into smaller compass. Under conditions of scarce food, the animals may develop swimming appendages and detach itself from its base, but it soon returns to a fixed life and discards the temporary appendages. See *PROTOZOA, INFUSORIA*.

Vosges, Vozhe, Mountains, a mountain range extending along the southwestern frontier of Germany. Its southern portion forms a boundary between France and Alsace; the Belfort depression on the south separates the range from the Jura Mountains. The average elevation is less than 2000 ft.; the highest peaks are the Sulzer Belchen (4668 ft.) and Honeck (4472 ft.). The mountains contain large forests of pine and beech, where prowl wild boars and wolves; in the valleys are populous industrial centers.

Voting Machine, a machine which automatically records and counts votes, and also prevents repeating and other

fraudulent practices. It furthermore affords more secrecy, is cheaper, works with more rapidity and costs less than the paper-ballot system. Voting machines of different forms have been



VULCAN

used in various cities. The first one given a trial was in New York City in 1892. Though varying in construction, all voting machines are made on the same principle, being similar in parts to adding machines. By a system of curtains hung on levers, the machine is made ready to

register as soon as the voter enters the booth and closes the curtains about him. Candidates have their names arranged either by parties or alphabetically, and the voter can designate either a straight ticket or he can select his individual candidates by using the various push buttons, keys or levers, suitably arranged for this purpose. On leaving the booth the act of opening the curtains or swinging an exit door resets the machine for the next voter. Sometimes a tape is added, on which revolve printing rollers indicating the number of votes registered, so that when the last man has voted, the final returns are ready for announcement.

Vulcan, *Vul' kan*, (in Greek, Hephæstus), artist-god of fire, son of Jupiter and Juno, was either born lame, or became so because of having been kicked from heaven, by Jupiter, for taking his mother's part in a quarrel. The Isle of Lemnos, where he fell, was ever after his favorite earthly resort. From various metals Vulcan fashioned the dwellings, furniture, weapons and trinkets of the gods. Besides, he made innumerable gifts for mortals, and it was he who fashioned Pandora. Etna and all places of underground fires were thought to be his workshops. The Cyclopes were his

aids. In art, Vulcan wears a short tunic. He is serious and muscular.

Vul'gate, the Latin translation of the Bible, which was, as revised by Jerome, officially adopted by the Roman Catholic Church in the Council of Trent, which declared that it be "held as authentic," and that "no one shall presume to reject it under any pretense whatsoever." Pius X in 1908 intrusted to the Benedictine Order the task of revising the text, beginning with the Old Testament. See BIBLE.

Vul'ture, a large group of birds of prey consisting of two families, the Old World and the American vultures. The members of these families are chiefly found in temperate or tropical climates and resemble the hawks and eagles, from which, however, they may be distinguished by their less strong claws, their unfeathered heads and their choice of food. The vultures feed almost entirely upon carrion. They are among the largest birds of flight. The American vultures differ from their Old World relatives in structure; they resemble them closely in appearance and habits. The best-known vultures are the condors, turkey buzzards, king vultures, lammergeiers, black vultures and Egyptian vultures. See CONDOR; LAMMERGEIER.

W

WABASH, *Waw' bash*, Ind., a city and county seat of Wabash Co., 42 m. s.w. of Fort Wayne, 90 m. n.e. of Indianapolis and 130 m. s.e. of Chicago, on the Wabash River and on the Cleveland, Cincinnati, Chicago & St. Louis, the Wabash and other railroads. There is also excellent interurban electric service. It is situated in a fertile agricultural region and has an important trade in farm and dairy products. The city contains lumber and coal yards, large railroad repair shops and ironworks and manufactories of flour, wagons and carriages, spokes, boots and shoes, woolen goods, church, school and office furniture, cash registers, sleds, carts, box board and paper. It contains a number of notable public buildings, among them being the Soldiers' Memorial Hall, Masonic Temple, Woman's Orphan Home and Wabash City Library. The town was incorporated in 1837 and chartered as a city in 1866. Population in 1920, U. S. census, 9872.

Wabash River, the most important northern tributary of the Ohio. It rises in the Grand Reservoir in Mercer County, Ohio, flows northwestward, then southwestward across Indiana, then southward and into the Ohio. From a short distance below Terre Haute it forms the boundary between Indiana and Illinois. Its length is about 550 m. It is navigable throughout the year to Covington, and during high water to Lafayette.

Wa'co, Tex., the county seat of McLennan Co., situated on the Brazos River, 100 m. n.e. of Austin, 238 m. n.w. of Galveston and on the Houston & Texas Central, the International & Great Northern, the Missouri, Kansas & Texas and other railroads. The city is regularly laid out and the residential section is on high land above the river. The prom-

inent public buildings include the Federal Building, the county courthouse, the Waco Natatorium, the Masonic Temple and several prominent banks and business blocks. The leading industrial plants include flour mills, cottonseed-oil mills, harness and saddlery works, grain elevators, oil refineries, bottling works, and manufactories of cotton products, millwork, sash and doors, and shoe dressing. There is an excellent system of public schools, and the institutions of higher education include Baylor University (Baptist), Paul Quinn College, (Methodist, Colored), and Academy of the Sacred Heart. There are several business colleges. Waco is an important distributing center for the surrounding country. Waco was laid out in 1849 and incorporated in 1850. Population in 1920, 38,500; estimated, 1925, 43,912.

Wade, Benjamin Franklin (1800-1878), an American statesman, born in Massachusetts. He removed to Ohio when 21, and after being admitted to the bar, was the law partner of Joshua Giddings. In 1837 he became state senator, in 1847 district judge and in 1851 a United States Whig senator, to be twice reelected by the Republicans. He was a powerful leader, consistently advocating all anti-slavery measures and being a radical reconstructionist.

Wa'ges, the sum paid for personal services. The term is restricted to the money paid per day or week for mechanical or muscular labor, as distinguished from salary, an amount paid for professional occupations at monthly or yearly intervals; or fee, the sum paid to doctors or lawyers at stated intervals for services rendered.

Wages fall under the general laws of supply and demand. The demand for labor is a demand for the products resulting from the activities of the laborers. The supply of labor is a matter of

the number of available laborers and their efficiency. Hence the wage scale is determined in general by this demand and supply. Other factors enter into the determination of difference of wages in varying kinds of employment. Adam Smith enumerates these as follows: the agreeableness or disagreeableness of employments; the cheapness or expense of learning them; the constancy of employment; the responsibility of those engaged in them; and the probability of success. Within narrow limits the State can control the rate of wages, by the passage of factory acts and bills for labor reform. Trade unions regulate the wages of their members. See CHILD LABOR; LABOR ORGANIZATIONS.

Wagner, Vahg' ner, Richard (1813-1883), a German composer and originator of the music-drama, born in Leipsic. Although his parents were not musicians, Wagner early showed talent in this line, for while at the Kreuzschule in Dresden he set a tragedy, which he had written, to music. His first music master, Gottlieb Müller, was too pedantic for Wagner's assertive genius, and in 1830 he matriculated at the University of Leipsic. In 1833 he became conductor of the opera at Magdeburg. At this time he composed several operas, but *Das Liebesverbot* was the only one which even received recognition. In 1836 he married Wilhelmina Planer, an actress, and moved to Riga, where he had accepted a position as conductor. In 1839 he went to Paris with an unfinished opera based on Bulwer Lytton's *Rienzi*, but it was not accepted. However, he finished it and in 1842 it was produced at Dresden, where it was a great success and did much to establish his reputation. After this success he designed a libretto, *The Flying Dutchman*, which was received with enthusiasm in 1843. This same year he was installed as Hofkapellmeister at the Dresden Theater and soon began on an opera, choosing the legend of Tannhäuser (See TANNHÄUSER) and collecting his materials from ancient and medieval poems. On Oct. 19, 1845, this great work was produced with a power-

ful cast, but it was not the great success which its modern popularity would lead one to expect, for it embodied principles ahead of the time.

In 1849 he engaged in political discussions, which later resulted in a warrant for his arrest. He escaped by fleeing to Weimar, where Liszt aided him to reach Zürich. Here he remained in retirement for years, spending his time writing prose. On Aug. 28, 1850, under Liszt's direction *Lohengrin* was produced in Weimar. Wagner had written this before fleeing from Dresden, and the medieval studies which he had become so interested in during his work on *Tannhäuser*, bore rich fruit in this new opera.

During his exile Wagner had time to meditate and plan much which later took permanent form, and to perfect his musical style. In May, 1854, he completed the composition of *Das Rheingold* and in 1855 went to London for a short time, where he conducted concerts of the Philharmonic Society. Two years later the libretto of *Tristan und Isolde*, based on a Celtic legend, was finished, and in 1859 the music for it was completed. In the same year, through the influence of the Prince and Princess Metternich, *Tannhäuser* was accepted at the Grand Opera in Paris and produced after much preparation, but because of hostile demonstrations instigated by the Jockey Club, it was withdrawn after the third performance. The Princess still continued as his friend and succeeded in having the ban of exile lifted, so that he was allowed to return to any part of Germany except Saxony, and later even this restriction was removed.

Wagner settled in Vienna, where for the first time he heard *Lohengrin* produced. His circumstances were such that despair almost overtook him, and a letter from King Ludwig of Bavaria asking him to come to Munich and finish his work seemed like a burst of sunshine on a dark day to this man who had worked so hard to embody his principles in his art while suffering from want. In 1863 he had published the libretto of

Der Ring des Nibelungen, which attracted the attention of King Ludwig. As a result he wrote to Wagner, who accepted his invitation with joy and an annual grant of £120 was given to him, which was later increased. *Tristan und Isolde* was produced in 1865 and *Die Meistersinger* in 1868, having been completed the previous year. Intrigues at court forced Wagner to leave Munich before the latter was presented, and he went to Lucerne, but the King continued to be his steadfast friend so that in 1869 *Das Rheingold* was given, and in 1870 *Die Walküre*.

In 1865 his first wife died and in 1870 he married Cosima, daughter of Liszt, who had previously been the wife of Von Bülow. Baireuth having been chosen as the site of a theater in which the production of *Der Ring des Nibelungen* was to be given, Wagner moved here in 1872. At last, 28 years after its conception, *Das Rheingold* was given as a part of the great whole, to be followed by *Die Walküre*, *Siegfried* and *Götterdämmerung*. The performance excited unusual attention, but ran the management in debt and the money had to be raised by outside performances in London and Munich.

Wagner's next and last work, *Parsifal*, based on the legend of the Holy Grail, was produced in 1882 in Baireuth under his own direction. After this his health declined rapidly, and he went to Venice in 1882, where he died the following year.

Wagner broke away from the rigid classical form which had long held sway, and let inspiration and freedom be the guide in his composition. This important step alone would be enough to make his fame enduring without the added luster of the founding of the music-drama. His music, whether heard in connection with the stage or as a selection, thrills with life, for his musical invention enabled him to put his system of leading motive into form which might otherwise have remained only a theory. His tone color effects, new and daring harmonies and wealth of chromatic progression

place him centuries ahead of the Classical School preceding him. He wrote all his own librettos, using much of the German legendary material, and thus revived a great interest in this part of the national literature. *Lohengrin* and *Tannhäuser*, though really operas, show touches of his later work, but in *Der Ring des Nibelungen*, *Tristan und Isolde*, *Die Meistersinger* and *Parsifal* we have the true music-drama which caused his lasting fame.

Wag'tail" Family, a family of birds whose name is suggested by wagging and jerking of the tail. They are active birds, running rapidly along the ground. The flight is wavelike, or undulatory. The family is represented in the Old World by a large number of species, but only two species are native to America. The American species are called pipits or titlarks.

PIBIT. The common pipit, or titlark, is the best-known wagtail. It is larger than the English sparrow and is grayish-brown, more or less streaked. The blackish wings have two buff bars and the outer tail feathers are marked with white. The nest is built on the ground and is made of dried moss or grass lined with hair and feathers. Four to six eggs spotted with deep brown are laid. The pipits are essentially birds of the open fields or country roadsides. They live in most parts of North America, breeding in the higher mountains and wintering in the South.

Waite, Wate, Morrison Remick (1816-1888), an American jurist, born at Lyme, Conn., and educated at Yale. In 1839 he was admitted to the bar, and after a successful practice at Maumee City and Toledo, Ohio, was elected to the Legislature. He declined election to Congress and admission to the bench of the Ohio Superior Court; but in 1871 went to Geneva as United States counsel in the Alabama case. Three years later President Grant appointed him chief justice of the United States Supreme Court, to succeed Salmon P. Chase, and this office he filled until his death, winning distinction for his fairness and learning.

Wake'field, Mass., a town of Middlesex Co., 10 m. n. of Boston, on the Boston & Maine Railroad. The town contains the villages of Wakefield, Greenwood and Montrose. Wakefield is situated in an agricultural region and has important manufactories of knit goods, pianos, stoves, furnaces, rattan goods, boots and shoes, flour and brass goods. The Beebe Library and a home for aged women are located here. Population in 1920, 13,010; State census, 1925, 15,611.

Wake Robin. See TRILLIUM.

Waldeck-Rousseau, *Val' dek'-Roo'* *so'*, **Pierre Marie Ernest** (1846-1904), a French statesman, born at Nantes. In 1879 he was elected deputy for Rennes, he was minister of the interior under Gambetta in 1881 and under Jules Ferry from 1883 to 1885, and in 1894 he was elected to the Senate. The following January he was a candidate for the presidency of France, and in June, 1899, upon the fall of the Dupuy cabinet, he became premier, with the portfolio of the interior. His cabinet was remarkable for containing members of such wide divergence of views, and among the noteworthy measures for which the administration was responsible, were the proclamation of a general amnesty law for those connected with the Dreyfus case, and the Association Bill of 1901, which abridged the powers of religious bodies. Waldeck-Rousseau was victorious in the general election of 1902, but resigned in June of that year, after having held the premiership longer than any other premier since the formation of the Third Republic.

Waldenses, *Wol den' seez*, the name given the followers of Peter Waldo and their modern successors. Waldo lived in Lyons, France, in the latter part of the 12th century. Having determined to devote his life to the cause of religion, in 1170 he gave all his money to the poor, went forth to preach to them and soon had a number of followers. The central idea of his teaching, that all Christians had the right to interpret, for themselves, the Scriptures, brought the Waldenses under the ban of the Church.

In the course of time persecution drove them out of France. In the 13th century they occupied the upper valleys of Piedmont, where they suffered persecution in 1220; in 1231 Pope Gregory IX excommunicated them. Their numbers increased, however, and they remained steadfast through centuries of persecution until 1848, when they acquired civil and religious liberty. The Waldenses of today are Calvinists in belief and have a Presbyterian form of church government. They live within the borders of Italy but speak the French language. In 1901 they were reported to have 47 churches, 66 stations, 49 pastors and 6180 communicants. They have congregations not only in Italy but at Marseilles, France; Rosario, Argentine Republic; Monett, Mo.; and in North Carolina.

Waldersee, *Vahl' der za'*, **Alfred**, COUNT (1832-1904), a German soldier, born at Potsdam. Entering the army in 1850, he served in the Seven Weeks' War and in the Franco-German War, for services rendered being made a colonel. He was quartermaster-general of the Prussian staff, succeeded Moltke as chief of staff and, having later been appointed inspector-general, in 1900 became field marshal. During the Boxer trouble in China, 1900, he commanded the German army and the allied forces, but arrived too late to direct his troops before Peking.

Wales, a principality of Great Britain forming a broad peninsula on the western part of England, between the Irish Sea upon the n. and Bristol Channel upon the s. It is divided into 12 counties, the northwestern of which is entirely cut off from the mainland by the Menai Straits and forms the Island of Anglesey. The surface of Anglesey is flat or rolling, but the rest of Wales is rugged and mountainous, being crossed by the intersecting ridges known as the Cambrian Mountains. Snowdon, the highest peak of these mountains, is also the most lofty summit of England. Many beautiful rivers traverse Wales. Among these are the Wye, the Severn, the Usk,

the Clwyd and the Dee. The lakes are small but picturesque.

The chief industry is mining, for the country abounds in mineral wealth of various kinds. Coal mines are found in all sections, and their yield is prodigious. Cardiff, the chief seaport, is said to ship more coal than any other port in the world. After coal, iron is the most important mineral, and near Glamorgan, in the southwestern section, great foundries and smelters are located. Other minerals mined are copper, lead and zinc. Slate is quarried in great quantities. Cattle raising is the only branch of agriculture practiced to any extent. The most important cities are Bangor, Pembroke, Carmarthen, Swansea and Cardiff.

The scenery of Wales is picturesque in the extreme. The coast is indented by bays and inlets whose rocky walls rise in solid line. The valleys and moors are covered with moss and ferns, while up the mountain slopes, shrubbery, chiefly the mountain heather, grows in abundance. The Welsh people are a branch of the Celtic race who call themselves Kymry. Their own language is a not unmusical one, though it contains many consonants and is spoken with difficulty by foreigners. Most of the Welsh also speak English. In religion the people are generally dissenters from the Church of England. Wales was once a part of the Roman territory of Britannia and later proved to be a place of refuge for the Britons who were driven from England during the Anglo-Saxon conquest. Wales acknowledged the supremacy of the Norman rulers but was practically independent until the time of Edward I, who conquered the country and gave to his son Edward II the title Prince of Wales, a title still given to the heir apparent of the English throne. In the 14th century Wales endeavored to regain its independence, but the attempt was only partially successful, and the country became a part of England in 1536. Its population is now 2,032,000.

Wales, Prince of, title borne by the eldest son of the sovereign of Great

Britain and Ireland. On the accession of Edward I (1272), Llewellyn, the Welsh prince, refused to do him homage. Llewellyn was killed in 1282, the Welsh nobles submitted to the English ruler, and the title of Prince of Wales was conferred upon his son, who had been born at Carnarvon Castle a few days before the surrender. Edward III in 1343 invested his son, the Black Prince, with the principality, and since that time the eldest son of each reigning king has borne the title.

Walhalla, *Wol hal' a*, or **Valhalla**, *Val hal' a*, the heaven where dwelt the Scandinavian gods and the Vikings. Heroes slain in battle were especially welcomed and the inhabitants passed their time in alternate feasting with Odin and fighting their battles again. They drank unflinching draughts of mead from the udder of the goat. Heidrun and the flesh of the boar Schrimnir, renewed every day, furnished a daily banquet. From the sides of the hall flashed the gleam of their swords, while the roof was covered with their shields and the seats with coats of mail.

Walhalla is also the name of a marble temple, one of the most remarkable buildings of Germany. It commemorates wars between Germany and France, which ended with the downfall of Napoleon. It is a copy of the Parthenon and was made to contain the busts of all great men and women of Germany. There are over 160 busts and a number of marble tablets, upon which are inscribed the names of famous persons of whom no reliable portrait could be found.

Walk'er, Francis Amasa (1840-1897), an American statistician, educator and economist, the son of Amasa Walker. He was born at Boston, graduated at Amherst and began the study of law; but enlisted in the Union army and served during most of the Civil War as a lieutenant-colonel. For gallantry at Chancellorsville, where he was wounded, he was brevetted brigadier-general of volunteers. After teaching for three years, he became chief of the bureau of statistics at Washington in 1869, super-

intendent of the Federal census in 1870, and commissioner of Indian affairs in 1872. During eight years (1873-1881) as professor of political economy and history at Yale, he lectured also (1877-1879) in Johns Hopkins University, represented the nation at the monetary conference of 1878 in Paris, and in 1880 again supervised the taking of the Federal census. From 1881 until his death he was president of the Massachusetts Institute of Technology. He was a member of many learned societies, was president of the American Statistical Association, 1882-1897, and also of the American Economic Association, 1885-1892. His writings include *The Making of the Nation, Land and Its Rent* and *The Wages Question*.

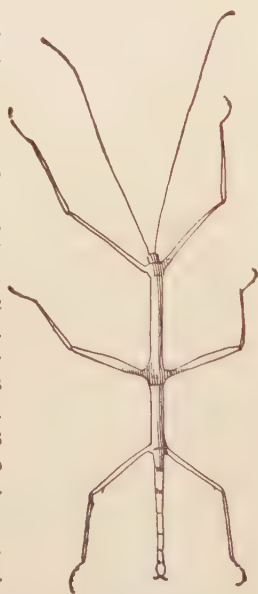
Walker, Horatio (1858-), a Canadian painter, born in Ontario. He studied for his profession in Toronto and New York and is known as the painter of French Canadian rural life. His works include *A Siesta, Swine Herd and Pigs, The Prodigal Son, October Morning, Calves in Spring and Plowing—the First Gleam*. He has exhibited in New York, has received various medals and has had several of his paintings added to the Ottawa National Gallery.

Walkingstick, or Twig Insect, a family of curious insects of the order Orthoptera. The peculiarity of members of the family consists in the accuracy with which they mimic, in form and color, the leaves and branches upon which they rest. The true walkingsticks are long, twiglike creatures, with angular legs capable only of slow, sluggish move-

ment. They feed upon the leaves of many trees, especially the oak and walnut, and deposit their eggs in places where they will be undisturbed for the one or two years which it takes them to hatch. Aside from their gray-brown coloration, the walkingsticks protect themselves by the excretion of an ill-smelling liquid, offensive to man and to the insects which prey upon them. The leaf insect is a member of the same family. See MIMICRY.

Wallace, Lewis (1827-1905), a well-known American soldier and novelist, better known as Lew Wallace, born in Brookville, Ind. He studied law, which he practiced at Crawfordsville, Ind., meanwhile serving in the Mexican War and belonging to the Indiana State Legislature for the term beginning 1848. When the Civil War broke out he was made colonel of an Indiana regiment, soon became brigadier-general of volunteers and, for leading a division at the siege and capture of Ft. Donelson, was made major-general in 1862. Later Halleck caused his removal, but Grant had him reinstated. In 1878 he became governor of New Mexico, and from 1881 to 1885 was United States minister to Turkey. He wrote *Ben Hur, The Fair God, The Prince of India* and *The Boyhood of Christ*. *Ben Hur*, a story of Palestine and Rome in Christ's time, has always been very popular and has been dramatized with great success.

Wallace, Sir William (about 1272-1305), a famous Scotch patriot, the younger son of a knight. Nothing definite is known of his education or early life; but he is described as of herculean build and as being an excellent commander. According to his biographer, Blind Harry, the turning point in the life of Wallace was the slaying of Hezelrig, in revenge for his wife's murder. Having previously led the insurgent warfare against the English ruler, Edward I, he was subsequently besieging Dundee Castle when he learned that the Earl of Surrey was marching the English army to Stirling. On Sept. 11, 1297, he met Surrey, completely defeating him. The en-



WALKINGSTICK

tire kingdom then submitted to Wallace, who crossed the border and ravaged Cumberland and Northumberland, on his return being elected governor of Scotland. The following year he met Edward in person at Falkirk, where his defeat is generally assumed to have been caused by the jealousy of various Scottish nobles. Be this as it may, Wallace then resigned his high office and retreated into an obscurity almost as dense as that which shrouds his earliest years. It is known for a certainty, however, that he continued the struggle for Scotland's independence and never swore fealty to England. When Edward offered pardon to the Scots in 1304, Wallace was excepted by name, and the next year he was delivered to the English by his own countrymen. Carried to London, he was there executed after having been found guilty of treason.

Wal'la Wal'la, Wash., a city and the county seat of Walla Walla Co., about 200 m. s.w. of Spokane, on the Northern Pacific, the Washington & Oregon and other railroads. Further transportation is furnished by an interurban electric line. The surrounding region is engaged in farming, grains, especially wheat, and apples being the principal crops. There are stock-raising, dairying and poultry industries, and the city is an important wholesale and distributing center, not only for southeast Washington, but for adjacent parts of Oregon and Idaho. The manufactures include farming tools, foundry and machine-shop products, lumber, harvesters, thrashing machines, structural steel, leather, flour and gristmill products, dried fruits, cigars, candy, ice, brick, saddletrees, sash, doors and blinds. The city is well known as an educational center, its leading institutions being Whitman Conservatory; Walla Walla College (Adventist); St. Vincent's Academy for girls and De La Salle Academy for boys, both Roman Catholic; and St. Paul's School (Protestant Episcopal) for girls and a splendid modern high school. A new Federal Building, a state penitentiary, a U. S. Veterans' Hospital, a Carnegie

library, a Y. M. C. A. Building, the Stubblefield Home for Widows and Orphans and the State Odd Fellows' Home and an armory are important features. Ft. Walla Walla was built on the site of the present city in 1857. A town was soon laid out, which in 1859 became the county seat, and three years later it was chartered as a city. Population in 1920, U. S. census, 15,503.

Wallenstein, Wol' en stine, or **Waldstein, Albert Eusebius Wenzel von** (1583-1634), Duke of Friedland, Sagan and Mecklenburg, a leader of the imperialistic forces in the Thirty Years' War. His parents were Protestants, but soon after their death he was won over to the Catholic faith. He was educated in the universities of Altdorf, Bologna and Padua and traveled in France, Germany and other countries. He acquired great wealth through marriage, and when the Bohemian Revolution broke out, he sent a regiment to aid the Emperor. Later he raised, equipped and maintained an army of 20,000 against Denmark. Acting in conjunction with Tilly he defeated the opposing forces under Mansfield at Dessau in 1626. During this campaign his army was given the greatest license, and the Emperor received many complaints from the princes through whose territory they marched. Nevertheless, because of Wallenstein's great services, these complaints received no attention. Wallenstein continued to increase his power, and it became evident that he was intriguing against the Emperor and in his own interests. The opposition against him became so strong that in 1630 he retired for a time. On the death of Tilly in 1631, and on the advance of Gustavus Adolphus towards Austria, he took command of the imperial forces. At the Battle of Lützen, 1632, Wallenstein was defeated and Gustavus Adolphus was killed. Wallenstein then opened secret negotiations with France and with certain German princes. The Emperor, unable to remove him from power, caused him to be assassinated at Eger.

Wal'ler, Edmund (1606-1687), an English poet born at Coleshill in Buck-

inghamshire. He was educated at Eton and at Cambridge. Once a Royalist, he later gave his support to the Commonwealth, and in 1661 was elected to Parliament for Hastings. Three editions of his collected poems appeared in 1645. He was very skillful in the use of the heroic couplet, and, although most of his poetry has little interest at present, he is remembered for the charming lyrics, *Go, Lovely Rose* and *On A Girdle*.

Wal'lingford, Conn., a city of New Haven Co., 12 m. n. of New Haven and 22 m. s. of Hartford, on the Quinnipiac River and on the New York, New Haven & Hartford Railroad. There are large manufactories of sterling silver, nickel plate, rubber and brass goods, insulated wire, fireworks, iron and brass bedsteads and britannia ware. The villages of East Wallingford and Yalesville are included within the corporate limits of the town. It received its present name in 1670 and is one of the oldest towns in Connecticut. A branch of the Oneida Community was established here in 1851, but the property is now owned by the Free Masons, who have erected a State Masonic Home. Population in 1920, 12,010.

Wal'lis, Katherine Elizabeth (1861-), a Canadian sculptor, born in Ontario. She studied art at Edinburgh and at Dresden, took up sculpturing at the South Kensington National Art Training School and under Waldmann in Paris, and has exhibited at London, Paris, Dresden, where in 1901 one of her works was bought by the International Exposition, at Liverpool, Leeds and in Peterborough, Ontario. The Ontario Government purchased her *Mercury Charmed by His Own Invention* for the Toronto Educational Museum.

Walloons, Wol loons', a people now inhabiting southern Belgium. They are of a mixed Gallic and Teutonic descent and originally used the old French dialect. Their language, which now they also call Walloon, differs slightly in the various provinces. The Walloons, who now number some 2,750,000 persons, are large in stature, and have black hair and eyes.

Wall Paper. See PAPER HANGINGS.

Wal'nut, the name of several species of handsome and valuable trees classed together in the Walnut Family. They are large trees with rugged, firm bark, which in the black walnut is very dark, and in the white walnut is rather yellowish. The branches of the walnut are stout and covered with rather fragrant leaves which are made up of many long leaflets. The flowers are of two kinds: those bearing the stamens are in slender catkins; those which are to produce the fruit are in loose clusters. The nuts



WALNUT

1, Branch; 2, fruit; 3, cross section of fruit

are covered with a juicy husk, green on the outside, but brown within and producing a permanent brown stain. The kernels of the nut are rich in oils and are nutritious as well as agreeable to the taste.

The black walnut is probably the most common in the United States. Its wood is heavy, rich brown in color and capable of receiving a high polish. Of all natural woods, this walnut has been probably the most popular for interior decoration, furniture and cabinetwork; but the large walnut groves which produced it

have been so nearly cut over that the wood is scarce and consequently more valuable than ever; black walnut furniture is especially highly prized. The nuts of the black walnut are easily distinguished from those of the white walnut, or butternut, by being more nearly spherical in shape.

The English walnut is a Persian tree whose nuts are thinner shelled and sweeter. Before being placed on the market the nuts are bleached by being dipped in a solution of sal soda, chloride of lime and sulphuric acid. These nuts are among the most widely used, and raising them is becoming an important industry of California.

Walpole, *Wol' pole*, **Horace**, FOURTH EARL OF OXFORD (1717-1797), an English statesman and man of letters, born in London. After traveling abroad, he took his seat in Parliament in 1741, and six years later built his famous villa and literary establishment, Strawberry Hill, near Twickenham. His weird romance, *The Castle of Otranto*, and the gruesome tragedy, *The Mysterious Mother*, both so full of specters, bleeding statues and horrors, as to take the reader unaware and make him "afraid to go to bed o' nights," mark the beginning of the Gothic revival in the Romantic movement in literature. He also published *Anecdotes of Painting in England*, *Catalogue of Royal and Noble Authors of England* and memoirs of the reigns of George II and George III.

Walpurgis, *Vahl poor' ges*, **Saint**, niece of St. Boniface, apostle of the Germans. She was born in England but went to Germany as a missionary, and became abbess of a convent in Franconia about 750. She had a reputation for great learning, and after her death she received the honors of a saint. For some reason the name of Walpurgis has been placed in German almanacs against the first of May, and the eve of May first has been called Walpurgis Night, from this circumstance. As the first day of May is very important to the German farmer, it was once supposed that the Devil and witches were active at this

time. Straw was burned in many places on Walpurgis Night to scatter the evil beings, a custom still kept up in some places. Many German customs connected with the first of May had their origin in this superstition.

Wal'rus, a large carnivorous Mammal of the Seal Family, found in Northern seas. It differs from true seals in hav-



WALRUS

ing a more rounding head and two long, incurved tusks, which are of use in procuring food and in defending itself. Like seals, the walruses clamber over ice floes and rocky beaches, but they are more awkward than the seals and are said to have less intelligence. They are hunted for their hides and oil. The young are black in color, but fade through shades of brown and yellow until in old age they are nearly white.

Waltham, *Wol' tham*, **Mass.**, a city of Middlesex Co., 10 m. w. of Boston, on the Southern and Western Division of the Boston & Maine Railroad. The Charles River, which is a part of the Metropolitan Park system, runs through the center of the city. Electric interurban connections are made with Lexington, Concord, Lowell, Arlington, Newton, Wellesley, Natick, Framingham, Worcester, Watertown, Cambridge and Boston.

The general character of the country in and around Waltham is level, with an inclination to become more or less hilly in the northeastern portion. Prospect

Hill, which is 482 ft. above the level of the sea, has been converted into a park and contains 137 acres. This high elevation of land affords a magnificent view of the surrounding country, and was used by Washington during the Revolutionary War as a signaling station. In addition to the Prospect Hill Reservation, there are the Beaver Brook Reservation containing 43 acres, the Charles River Reservation, extending throughout the city, Robbins Park, Fitch Park, Appleton Park, the Waltham Common and more than 25 acres of public playgrounds. Canoeing is a popular pastime on the Charles River. More canoes are owned between Waltham and Riverside, a distance of three miles, than in any other place in the world. During the annual river carnival, it is frequently possible to walk from one side of the river to the other by stepping from one canoe to another.

INSTITUTIONS. The Massachusetts School for Feeble-Minded is located in Waltham, and was the first institution of its kind established in this country. It was organized in Boston in 1848, but subsequently removed to Waltham. In addition to an efficient public school system, there are the Notre Dame Normal Training School, the St. Joseph Parochial School, the French Training School, the Waltham Horological School, in which practical watchmaking and repairing is taught, the Waltham Training School for nurses, the Leland Home for aged women, the Waltham New Jerusalem School, the Waltham Hospital and the Waltham Baby Hospital.

INDUSTRIES. Waltham has the distinction of having the largest watch factory in the world, and it is also the largest watch-producing city in the world, the annual output being about 1,000,000 watches. It also has the distinction of being the home of the first cotton mill erected in the world, in which raw cotton was made into a finished product under one roof. This was established in 1813. At the present time it produces 250,000 tons of yarn and 12,000,000 yards of cloth annually. Waltham has

the only pearl-button factory in New England and one of the few east of the Mississippi Valley. The Waltham Bleachery and Dye Works covers an area of ten acres, and finishes between 40,000,000 and 45,000,000 yards of cloth each year. Among other diversified manufactures are watch jewels, clocks, watchmaking machinery, watchmakers' tools, watch dials, motor carriages, aeroplanes, emery wheels, rivet and buckle-factory products, screw-factory products, iron- and brass-foundry products, fine dress goods, cotton cloth, woolen yarn, sweaters, pearl buttons, canoes, church organs, paper, paper bags, suit cases, automobile accessories, novelties, lock washers and chemicals.

HISTORY. The first white settlement was made in 1640. The Township of Waltham was organized in 1738. A portion of Cambridge was added in 1755, and a part of Newton in 1849. Waltham was chartered in 1884. Pop., 1920, 30,891; State census, 1925, 34,926.

Walther von der Vogelweide, *Vahl' ter fon der Fo' gel Vi' de*, (about 1170-about 1230), a medieval German lyric poet. His early work was charming and spontaneous—he wandered around from court to court singing for his bread—and free from the didactic elements which crept in with his advancing years. One of his finest lyrics is *Unter der linden*. Ranked by some as Germany's greatest lyric poet before Goethe, his charm lies in the passionate, human qualities that his best writings possess.

Wal'ton, Izaak (1593-1683), an English author, born at Stafford. He was an ironmonger in Fleet Street, and while he lived in St. Dunstan's Parish he became an intimate friend of the vicar, Dr. John Donne. His biography of Donne, and those of Herbert, Hooker and Wotton, are written in a spirit of artlessness and simplicity that adds quaintness to its convincing manner of treatment. A greater work is his treatise, *The Compleat Angler*. It was published when he was 60 years of age, and leisurely extended and amplified through the succeeding quarter of a century. In this

pleasing and practical idyl he tells us of the joys of an angler's life, when one sits on cowslip banks along silent, silver streams, listening to the birds sing, and recommends for every man "flowers, and showers, and meat, and content, and leisure to go a-fishing."

Wampanoag, *Wom' pa no' ag*, a tribe of Algonquian Indians who, when first known to white men, occupied the territory around Narragansett Bay and the eastern part of Massachusetts. Their principal village, Pokanoket, was at the present Mt. Hope. Their numbers were greatly reduced by a pestilence in 1617, and they were nearly all destroyed in King Philip's War.

Wam'pum, the shell beads used by the North American Indians as money and ornaments. The beads were made from the insides of shells, and were purple or white in color, averaging a quarter of an inch in length. For ornament they were woven into belts, and the figures formed symbols or records of the history of the tribe. In many instances these belts were the only records the tribe possessed. When the beads were used as money they were strung together by means of holes drilled through the centers. The purple beads were worth considerably more than the white. In trading, the wampum strings came to have a fixed value, the standard being fixed by law and varying in the different states. Wampum was accepted by the colonists as a medium of exchange as late as the beginning of the 18th century.

Wanamaker, *Won' a ma' ker*, **John** (1838-1922), an American merchant, political leader and philanthropist, born in Philadelphia, Pa. At 14 he was errand boy in a bookstore, four years later he became a retail clothing salesman, and five years after that, in 1861, with Nathan Brown, he established in Philadelphia the clothing house of Wanamaker & Brown. This was enlarged into a general department store in 1876 and a similar business was opened in New York in 1896. In addition, Mr. Wanamaker not only had banking and railroad interests but took an active interest in

politics, and as a Republican of independent tendencies was postmaster-general in the cabinet of President Harrison from 1889 to 1893. Moreover, in 1858 he founded in Philadelphia and became superintendent of the Bethany Presbyterian Sunday School, one of the largest in the United States; he was elected the first American secretary of the Y. M. C. A. to receive a salary; he helped found the Christian Commission for the relief of the soldiers in the Civil War and served on the financial board of the Centennial Exposition. Also, he founded the Wanamaker Institute of Industries and the first penny savings bank, and financed the erection of many churches and other institutions, a number of which are in the Orient.

Wapiti, *Wop' i ty*, the noblest of the Deer Family, a native of America and once found from the Mississippi Valley to Alaska. It is larger than the English red deer, which it closely resembles, and has long antlers, but its coat is nearly the same color and equally as changeable. The antlers of the largest wapiti stag are four feet long and weigh 40 lb.; and the animal itself often weighs 1000 lb. The chief food of the wapiti is moss, lichens, grasses and tender branches of willow and poplar, but they thrive on whatever they can procure. In the spring and early summer the wapiti are solitary animals, but later they collect in large herds which are constantly in motion as they graze; at night they sleep in a huge circle near clear streams; the young and females are in the center with a ring of guarding bucks about them.

The wapiti is common now only in California, Oregon, at the headwaters of the Missouri and in British America, and is cared for in many parks where it takes readily to a sort of semidomestication. In many states it is protected by law. In the United States the wapiti is frequently though less accurately called the elk. See DEER.

War, the settlement of disputes between nations, states, clans or tribes by resource to arms. Traces of war are

found among the earliest records of the human race, and more abundantly as we get back to barbaric conditions. There are three conditions of society under which war arises. The first is an unorganized condition in which each family or clan is its own law, disputes giving rise to private war. The second is a condition of society in which a central government has been established, but has degenerated, and is objected to by a party and the attempt to establish rival claims leads to civil war. The third is a condition of society in which separately organized and independent states find cause for dispute, thus precipitating international war.

In the United States the Constitution gives to Congress the power to declare war; and in all civilized countries war is supposed to be the act of the governments involved, whether formally declared or not. The United States enters into negotiations with the offending power; and if these fail as in the case of Spain, an ultimatum is sent which must be complied with or a declaration of war follows. Spain refused to withdraw her troops from Cuba, as required by the ultimatum of the United States, and war was declared by Congress Apr. 25, 1898. But sometimes the formal declaration follows the actual beginning of hostilities, as it did in this case, the date of the beginning of hostilities being fixed by the declaration as the 21st of April. International law provides that noncombatants shall not be treated as enemies; trade, however, is prohibited between citizens of the belligerent powers except by permission; the invading army takes possession of such personal property of the state as may be useful to the enemy; the rights of private property are recognized and pillage is forbidden, but the invading army may not respect those orders. In that case loyal citizens are entitled to compensation for private property destroyed or used by the invaders, and such claims are usually paid by the government when properly proved, unless the government is destroyed by the war; an armistice or agreement to suspend

hostilities for a definite time must be respected and a flag of truce must be honored. War is finally terminated by surrender of one party or the other, or by a treaty of peace in which concessions may be made and terms agreed upon. See ARBITRATION, INTERNATIONAL.

Warbeck, War' bek, Perkin (1474-1499) a pretender to the English throne against Henry VII. A Flemish Jew, he was recognized by Margaret of York, Dowager Duchess of Burgundy, as her nephew, Richard Plantagenet, younger of the princes murdered in the Tower. For five years he gathered recruits, meanwhile marrying a kinswoman of James IV of Scotland, and in 1497 invaded England. On being captured and confessing his fraud, he was allowed to escape. Later he made an attempt on Cornwall, and was imprisoned with the genuine Earl of Warwick, with whom he was executed, after a last attempt at freedom.

War'bler, a family of wood warblers. These birds are peculiar to America, where over 125 species and races are known. They are mostly small birds, none exceeding eight inches in length. The colors are generally brilliant, those of the male often being especially bright. They all feed upon insects and are usually frequenters of more or less open woodlands. The nests vary much in form and construction, being placed in the crotch of a tree or bush, suspended from a limb, attached to a fork or placed on the ground. The eggs vary from three to six and are always spotted. The name warbler should strictly be applied to the kinglets and gnatcatchers, which number some 150 species and are mostly confined to the Old World; but by common consent the name seems to be almost universally used for the wood warblers. All of the warblers are migratory.

YELLOW WARBLER, or **SUMMER YELLOWBIRD**. This bird is a familiar example of the warblers. It is smaller than the English sparrow and is yellow all over, brighter below; the breast is streaked with reddish; and the wings and tail are brownish or olive, edged

with yellow. The female lacks the conspicuous streaks. This warbler builds a neat, cup-shaped nest of plant fibers, lined with feathers and down. It is placed in trees and bushes, usually rather low, and two to six spotted eggs are laid. The cowbird selects by choice the nest of the yellow warbler in which to deposit its eggs, and instances are known in which the warbler has built as many as four successive bottoms to its nest in order that the cowbird's eggs should not be hatched (See COWBIRD). The yellow warbler is seen more commonly about shrubs and trees on the edges of woodlands or in parklike areas. It is frequently called the wild canary, but this name should apply to the goldfinch. It ranges throughout the greater part of North America, migrating in winter to Central America and northern South America. See CHAT; REDSTART; OVENBIRD.

Ward, Artemas (1727-1800), an American soldier and jurist, born in Shrewsbury, Mass., and educated at Harvard. Having served in the French and Indian War, he commanded the forces gathered at Cambridge in 1775, until the arrival of Washington. He was then made first major-general under Washington, but resigned the following year. Later he was chief justice of the Court of Common Pleas, president of the Massachusetts Executive Council, for 16 years a member of the Legislature, where in 1785 he was speaker, and from 1791 to 1795 a member of Congress.

Ward, Artemus. See BROWNE, CHARLES FARRAR.

Ward, Elizabeth Stuart Phelps (1844-1911), an American philanthropist and author, born in Andover, Mass. She wrote articles for publication when she was 13, and has written a large number of novels popular in their appeal. Her interest in temperance reform led to her giving a series of lectures on the subject to the students of the Boston University in 1876. She was married to Rev. Herbert D. Ward in 1888. A mystical, religious note prevails in her work. She published *Ellen's Idol*, *The Gates Ajar*,

An Old Maid's Paradise, *Beyond the Gates*, *The Gates Between*, *A Singular Life* and *The Struggle for Immortality*.

Ward, John Quincy Adams (1830-1910), a distinguished American sculptor, born in Urbana, Ohio. His work includes portrait busts and ideal figures. Of the former, those of Alexander H. Stephens, Joshua R. Giddings, Hannibal Hamlin and John P. Hale are the most important. His *Indian Hunter*, completed after studies on the Western frontier; the bronze statues, the *Freedman*, *Shakespeare*, *Private of the Seventh Regiment* and the *Pilgrim*, are in Central Park, New York. Among his memorial statues are those of *Horace Greeley* and *George Washington*, the former in front of the Tribune Building, the latter on the steps of the Treasury Building, New York; *General Thomas*, Washington, *Israel Putnam*, Hartford, Conn.; and the Beecher Monument, City Hall, Brooklyn.

Ward, Lester Frank (1841-1913), an American geologist and sociologist, born at Joliet, Ill. After serving in the Federal army during the Civil War, he attended the Columbian University at Washington, where he graduated in 1869, and in law two years later. He then served for seven years in the United States Treasury Department, after which he was made assistant geologist under the United States Geological Survey, and in 1888 became paleontologist of the survey. Greatly interested in philosophical and social questions, he adopted in general the philosophy of Herbert Spencer, which he modified in the direction of greater insistence upon the psychical character of social phenomena. His philosophical writings include *Dynamic Sociology*, *The Psychic Factors of Civilization*, *Outlines of Sociology* and *Pure Sociology*. Among his works in paleontology may be mentioned *Sketch of Paleontological Botany* and *Geographical Distribution of Fossil Plants*.

Ward, Mary Augusta (Mrs. Humphry Ward) (1851-1920) an English novelist, born at Hobart, in Tasmania. She

was the granddaughter of Dr. Thomas Arnold and the niece of the poet and critic, Matthew Arnold. Early in life she came under the influence of scholarship and religious thought, and this is reflected in her own intense moral nature and the ethical quality of her writings. She married Thomas Humphry Ward in 1872 and in 1880 they settled in London. Her first literary work was in the form of reviews for *Macmillan's Magazine* and translations and studies, chiefly on Spanish subjects. She wrote *Milly and Olly* and *Miss Bretherton*, but her great triumph was *Robert Elsmere*, a problem novel, which appeared in 1888. The vital purpose of the book at times obscures its art interest. She assisted in founding University Hall, a settlement for the poor of London, in 1890. Among her other works are *The History of David Grieve*, *Marcella*, *Lady Rose's Daughter*, *Marriage of William Ashe*, *Fenwick's Career* and *The Case of Richard Meynell*.

War, Department of, that department of the government which administers military affairs. In England the head of the department is the secretary of state for war, and the divisions are military, financial and ordnance. In the United States the head of the war department is secretary of war, a member of the president's cabinet, and he acts under the president, who is commander-in-chief of the army and navy. There are ten bureaus of military administration. These bureaus are under the management of chiefs who are officers in the army and act under the secretary of war. The principal chiefs are: adjutant-general, who conducts correspondence, issues orders and receives reports; inspector-general, who inspects the condition of the army, its equipment and accounts; the quartermaster-general, who has control of supplies; the commissary-general, who has charge of food; the surgeon-general, who is chief medical and surgical officer; the chief of engineers, who superintends construction; the judge-advocate-general, who has charge of legal

matters; and the chief signal officer, who attends to apparatus for messages and signals. The war department also has charge of many public works, such as harbors, bridges and docks.

Ware, Mass., a town of Hampshire Co., 27 m. n.e. of Springfield and about 26 m. w. of Worcester, on the Ware River and on the Boston & Albany and Boston & Maine railroads. The surrounding farms and manufacturing villages near-by contribute to the industrial prosperity of the town. The principal manufacturing establishments include woolen, cotton and hosiery mills, machine shops, shoe factories and paper mills. Ware was settled in 1730 and incorporated as a town in 1775. Population in 1920, 8,525.

War'ing, George Edwin (1833-1898), American soldier and sanitary engineer, born in Poundridge, N. Y. He studied at College Hall, Poughkeepsie, and afterward gave particular attention to the study of agriculture and agricultural chemistry under James Mapes. Waring lectured extensively upon agriculture; in 1855 he began the management of Greeley's farm at Chappaqua, N. Y.; and in 1857 was agricultural and drainage engineer of Central Park, New York City. He was major in the 39th New York Volunteers in the first Battle of Bull Run, and in 1861 raised six cavalry troops at St. Louis. These troops were afterwards incorporated in the Fourth Missouri Cavalry, of which Waring was colonel until the end of the war. After the war, until 1877, he managed Ogden farm at Newport, R. I., and in 1878 was called to change the drainage system in Memphis, Tenn. In 1894 he was the commissioner of street cleaning of New York City, and in the face of great obstacles accomplished an almost impossible task, but was dismissed from his position when Tammany again secured control. In 1898 he was appointed a commissioner to report the sanitary conditions in Havana. While there he contracted yellow fever, from which he died. He wrote several books on sanitation and agriculture.

War'man, Cy (1855-1914), an American author and journalist, born in Greenup, Ill. He received a common school education, became a farmer and wheat broker in Illinois, and in 1880 removed to Colorado, where he became a locomotive fireman and engineer. In 1888 he accepted the editorship of the Denver *Western Railway*, and in 1892, that of the Creede (Colo.) *Chronicle*. In the latter year he married a lady who became the original of the once popular song, *Sweet Marie*, of which he was the author. He also published a number of railroad stories, among which are *Tales of an Engineer*, *The Express Messenger*, *Frontier Stories*, *The White Mail*, *The Last Spike* and *Weiga of Temagami*. He later removed to London, Ontario.

War'ner, Charles Dudley (1829-1900), an American essayist and novelist, born in Plainfield, Mass. In 1856 he graduated from the Law School of the University of Pennsylvania, and practiced law in Chicago for four years, whereupon he removed to Hartford. There he engaged in editorial work in connection with the *Hartford Press* (later the *Hartford Courant*), and afterwards conducted respectively "The Editor's Drawer" and "The Editor's Study" for *Harper's Magazine*. As correspondent to American newspapers he traveled widely and lectured frequently on prison reform and other philanthropic work. He wrote humorous and genial studies, revealing a wholesome love of nature and men. His writings embrace *My Summer in a Garden*, *Backlog Studies*, *Studies in the South and West*, with *Comments on Canada*, *As We Were Saying*, *The Golden House* and *The Relation of Literature to Life*. With S. L. Clemens (Mark Twain) he published *The Gilded Age*.

Warner, Susan (1819-1885), an American novelist, who wrote under the name Elizabeth Wetherell, born in New York. Her first novel, *The Wide, Wide World*, appeared in 1851, and though it had barely escaped rejection by its publishers, it became immensely popular

and, next to *Uncle Tom's Cabin*, is probably the most widely circulated novel of American authorship. *Queechy*, of 1852, was also popular, and her subsequent *The Old Helmet*, *Melbourne House* and *Daisy* were noteworthy. She collaborated with her sister, "Amy Lothrop," in juvenile books, and her works were translated into French, German and Swedish.

War of 1812, the name given to the second war between the United States and Great Britain, 1812-1814. The struggle between England and France, resumed in 1803, had heaped countless insults on neutral commerce. The various decrees and orders of the rivals subjected to capture practically all the vessels trading with Europe. Moreover, England insisted on the impressment of seamen and on the right of search; the Non-Importation Act, the Embargo Act and the Non-Intercourse Act failed of results and negotiations with England were fruitless. In consequence, a war party sprang up which forced President Madison to declare war, June 18, 1812. Five days later the Orders in Council, one of the most objectionable features of the British policy, were withdrawn.

Having contended with France for years, Great Britain was prepared for war. The United States, however, failing to appreciate the dangers attending a new republic, had exceedingly small military and naval forces. Besides, the country was not united, and the government was weak.

The conflict was waged on land and sea and may be summarized as the war along the Canadian frontier, along the Atlantic coast and along the Gulf coast, and sea duels. The first military movement was General Hull's invasion of Canada with 2000 men. He was forced to retreat, however, and surrendered at Detroit, Aug. 16, 1812, to General Brock. Two months later General Van Rensselaer attempted another invasion of Canada, only to be beaten at Queens-town (now Queenston), where Brock was mortally wounded. The following

year the Americans were defeated at the River Raisin, but they were successful at forts Meigs and Stephenson and at the Thames River, and recovered Detroit. In the meanwhile, in April, they had sacked York, and on Sept. 10 Commodore Perry had fought the Battle of Lake Erie, capturing the chief British fleet on the Great Lakes (See *ERIE, BATTLE OF LAKE*). The same year generals Wilkinson and Hampton failed to take Montreal; but in 1814 Gen. Jacob Brown again marched against Canada, capturing Ft. Erie and defeating General Riall's force at Chippewa. The engagement at Lundy's Lane followed, the Americans winning; but the British burned Buffalo and Black Rock and forced the Americans from Canada. In September General Prevost, with 14,000 men, invaded New York by way of Lake Champlain, and Commodore Macdonough defeated the British fleet under Downie near Plattsburg at the same time that General Macomb was repulsing the land detachment.

During the early part of the war the United States coast was blockaded from the east end of Long Island to the Mississippi. In 1814 New England was blockaded and then, when the abdication of Napoleon made it possible for England to send more men to America, a British fleet ascended Chesapeake Bay, put the American militia to flight at Bladensburg, entered Washington and burned the government buildings, under command of General Ross and Admiral Cockburn. Later in the year the British were repulsed from Baltimore.

In the meanwhile, New England had forcefully expressed her dissatisfaction with the war; this dissatisfaction culminated in the Federalist meeting at Hartford, Conn., in December, 1814 (See *HARTFORD CONVENTION*). As neither England nor the United States had won any vital victories, peace negotiations were opened. Moreover, Gen. Andrew Jackson, who had been fighting the Creeks in the South, had gathered a good-sized army of Kentucky and Tennessee frontiersmen which, in January,

1815, two weeks after peace had been concluded, met a formidable army of Wellington's veterans under General Pakenham at New Orleans, and utterly defeated them. See *NEW ORLEANS, BATTLE OF*.

On the whole, the United States was unsuccessful on land; but on the sea, notwithstanding the fact that her guns were outnumbered one hundred to one, she achieved some of the memorable victories of naval history. Famous ship duels occurred when the American *Constitution* captured the *Guerrière*; the *Wasp*, the *Frolic*; the *United States*, the *Macedonian*; and the *Constitution*, the *Java*. Later the *Chesapeake* was captured by the *Shannon* and the American frigate *Essex* made her famous cruise against British merchantmen, being finally compelled to surrender in the Pacific to the *Phæbe* and the *Cherub*, March 28, 1814.

Peace was not announced until February, 1815, though the Treaty of Ghent had been signed on Dec. 24, 1814. It made no mention of the important issues leading up to the war, provided nothing as to territorial boundaries, impressment of seamen or neutral rights in war time. Notwithstanding it was popularly approved. See *UNITED STATES*, subhead *History*.

War'rant, a legal document issued by a judicial officer, making legal acts which without it would be illegal. A warrant is generally issued to a sheriff or constable and is returnable to the officer issuing it. Warrants are issued for the arrest of persons alleged to have committed crime or for the purpose of searching one's premises for property named in the warrant. A warrant of this sort is generally called a search warrant.

Warranty. See *DEED*.

War'ren, Henry White (1831-1912), an American clergyman and author, born in Williamsburg, Mass., and educated at Wesleyan University. Having taught four years, he was ordained a minister, in the Methodist Episcopal Church, and held pastorates at Worcester, Boston, Cambridge, Charlestown.

Brooklyn and Philadelphia. In 1880 he was elected bishop. Bishop Warren wrote widely on many subjects, and his publications include *Recreations in Astronomy*, *The Bible in the World's Education* and *Among the Forces*.

Warren, Joseph (1741-1775), an American patriot, born at Roxbury, Mass., and educated at Harvard. After having taught school for a time, he began to practice medicine in Boston, 1764. Inflamed by the Stamp Act, he became associated with the Adamses, wrote for the *Boston Gazette* over the pen name True Patriot, led in the first Committee of Correspondence and drafted the Suffolk Resolves. He sat in the first three provincial congresses, being president, with virtually dictatorial power, of the third, and served on the Committee of Public Safety. Warren fought at Lexington but was killed at Bunker Hill before his appointment as major-general of Massachusetts forces had been made out, having declined chief command of the Continental army. Bunker Hill Monument stands near the spot where he fell.

Warren, Ohio, a city and county seat of Trumbull Co., 53 m. s.e. of Cleveland and 15 m. n.w. of Youngstown, on the Mahoning River and on the Pennsylvania, the Erie and the Baltimore & Ohio and other railroads. It is situated in an agricultural region and farming and dairying are important industries. The chief manufactures include electrical apparatus and supplies, shovels, fire extinguishers, pottery, bath tubs, rolling-mill products, flour, automobiles, boilers and steel ranges. There is a public library. Warren was founded in 1799 and incorporated in 1834. Pop., 1920, 27,050; estimated, 1925, 34,679.

Warren, Pa., county seat of Warren Co., 35 m. n.e. of Titusville, at the Junction of the Allegheny River and the Conewango Creek and on the Dunkirk, Allegheny Valley & Pittsburgh and the Pennsylvania railroads. Chautauqua Lake, N. Y., is 20 m. south of the city. It is in a productive natural gas and oil re-

gion and has extensive oil refineries. The principal manufacturing establishments are lumber mills, oil and gas engine factories, iron and boiler works, furniture and piano factories, oil-well supply works, ax and tool factories, etc. A state hospital for the insane is located here, and there are many fine municipal buildings. Warren was settled in 1795 and incorporated in 1832. Pop., 1920, 14,256; estimated, 1925, 15,116.

War'saw, once the capital of the Kingdom of Poland, now the capital of the government of Warsaw, situated on a terrace on a fertile plain on the Vistula River, about 404 m. e. of Berlin. While Warsaw has lost some of its political importance since the War, it has gained importance in other respects. The great industrial and commercial center of Poland, it produces a variety of products, including leather, machinery, carriages, lace and food products. With its seven Russian and thirty-odd Roman Catholic churches, it is a religious center. The University of Warsaw, founded in 1816, and other educational institutions of high rank, place the city at the head of the intellectual life of Poland. Two fine boulevards; a number of fine cathedrals, one of which dates back to 1360; castles of former kings; and splendid gardens give a background of beauty to life in this animated city. Pop., about 936,000.

War'ship", a vessel designed for offensive and defensive warfare. The first warships were wooden galleys propelled by oars, the defenders of which used missiles that could be thrown but a short distance. Close proximity to the enemy often caused the contending crews to lash their ships together and to engage in hand-to-hand conflicts. The advent of the sailing vessel, the introduction of gunpowder and the invention of cannon caused a development which resulted in the warship common from the 16th to the middle of the 19th century. While these ships differed somewhat in detail from century to century, they were all constructed practically on the same plan. At first the frames were entirely of wood, usually oak, and as strong as they could be made, consistent with the speed desired and facilities for navigating the ship. The guns were placed along each side of the ship on one or more decks, according to the size of the vessel, so that the side of the

ship must face that of the enemy's ship in order to fire upon it.

The frigate was the most efficient type of the modern warship, and it was with ships of this class that the American navy won renown in the War of 1812. Between 1854 and 1860 Great Britain and France constructed a number of ironclad vessels, but this style of warship did not become prominent until after the Civil War in America. The celebrated duel between the *Monitor* and *Merrimac* in 1862 at once brought the superiority of the ironclad warship into prominence (See HAMPTON ROADS, BATTLE OF), and since that time few unprotected warships have been built. The first ironclad ships, however, had wooden frames covered with armor plate. Later these were replaced by the modern ships, which are wholly of steel construction. The warships of the leading navies are classified as battleships, cruisers, torpedo boats, torpedo boat destroyers and submarines.

BATTLESHIP. The *Monitor* was a turret ship; that is, the guns were placed in a revolving turret. The ship was without masts, and the guns could be pointed in any direction by revolving the turret. While effective for coast defense, ships of this pattern were not adapted to long voyages, and they were practically useless in rough water. The defects led to the construction of ships on different designs, which have been modified from time to time, until the modern battleship is the result. The first ships of the new American navy were the old *Maine* and *Texas*, which were of less than 7000 tons displacement. These were followed by the *Indiana*, *Massachusetts* and *Oregon*, of about 10,000 tons. Later, ships of larger size were authorized, the *Connecticut*, commenced in 1902, having a displacement of 16,000 tons. At the time of its completion, the *Connecticut* represented the highest type of battleship. In 1905 the British Admiralty authorized the *Dreadnaught* of 18,000 tons, and soon after, other nations began the construction of ships of the

Dreadnaught type. In May, 1912, the new *Texas*, launched from the navy yard at Washington, D. C., was at the time of its completion the largest battleship in the world. It is 573 ft. long and 95 ft. beam; its total displacement is 28,367 tons; its draught is 28½ ft.; and its speed 21 knots an hour. The main armament is composed of ten 14-inch guns, distributed in five turrets arranged on the central line of the ship from stem to stern, and it is the first ship in the world to carry 14-inch guns. There are also over 20 5-inch torpedo boat guns. The armor belt is 13½ inches thick. On the turrets it varies from 9 to 18 inches in thickness, and the armor of the conning tower and tube is 16 inches. The combined weight of the projectiles from its broadside is 14,000 lb. These guns throw a shot weighing 1000 lb. over 12 m. and with sufficient force to penetrate most of the armor plate in use.

The growth of the warship from the *Monitor* in 1862 to the *Arkansas* in 1911 is illustrated on the following page.

The *Arkansas*, launched in 1911, is a little smaller than the *Texas* and has twelve 12-inch guns for her heaviest armament. She also carries 21 5-inch rapid-fire guns, four 3-pounders, two 1-pounders, two 3-inch field pieces, two 230-caliber machine guns and two 21-inch submerged torpedo tubes. These two ships are types of the best battleships in our own or foreign navies.

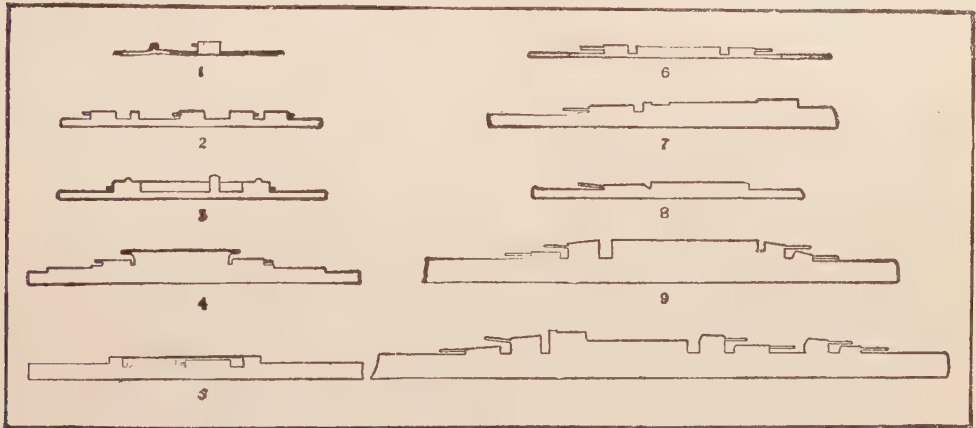
CRUISER. The cruiser is lighter than the battleship. It is designed for greater speed and can be more quickly turned about. The armament is light, never exceeding 6-inch guns, and it carries two or four torpedo tubes. When four are carried, two are submerged and two are above the water line. Cruisers are *armored* when their sides are protected with armor plate, and *protected* when the armor plate is on the decks alone. The largest cruisers, usually designated as first-class cruisers, are about 375 ft. long and have a displacement varying from 6000 to 9000 tons. Second- and third-class cruisers are smaller than those of

the first class, and usually have corresponding lighter armament.

In 1906 the British navy began the construction of "invincibles," or cruisers of the *Dreadnaught* type. The largest of these is 530 ft. long and 78½ ft. wide, and has a displacement of 17,250 tons. The armament consists of eight 12-inch guns mounted in four barbette turrets, so that three pairs of guns can fire directly ahead and three pairs directly astern, and the whole armament can

operating singly, and every war fleet, is accompanied by a screen of destroyers to protect it from submarine attack, and in the European War, submarines have found it practically impossible to get home an attack on ships so protected.

If a destroyer sights a submarine on the surface at a distance of 2 or even 3 miles, the chances are good that he will be able to destroy it, before it can submerge. By charging, the destroyer's 30-knot speed enables it to cover the inter-



1. *Monitor*, 1862
2. *Royal Sovereign* (British), 1862
3. *Miantonomoh*, 1876
4. *Dreadnaught* (British), 1875
5. *Inflexible* (British), 1876

6. *Puritan*, 1882
7. *Victoria* (British), 1887
8. *Ozark*, 1900
9. *Michigan*, 1908
10. *Arkansas*, 1911

fire on each side. There are also 16 four inch guns for defense against torpedoes.

TORPEDO BOAT DESTROYER, a war vessel for destroying torpedo boats and submarines, and for protecting warships and fleets from attack by these. A modern destroyer is 150 to 400 feet long, has a speed of 29 to 35 knots and is protected by armor heavy enough to resist the gun fire of submarines; its small size, high speed, and shallow draft makes it practically proof against being hit by a torpedo. It carries four 4 to 6 inch guns capable of sinking submarines, and also carries torpedoes. The advent of the submarine has made the destroyer indispensable; every modern warship when

vening 2 miles in 4 minutes and to come upon the submarine before it is completely submerged (which requires 4 to 8 minutes) and either ram it or sink it by gun fire. If the submarine attempts surface flight the greater speed of the destroyer enables it to quickly overtake it and destroy it. With the aid of an aeroplane to direct the pursuit, it has also been found possible for a destroyer to follow a submerged submarine and destroy it when it comes to the surface; a submarine at a depth of 20 feet is easily seen from an aeroplane; in 2 instances submarines have been destroyed by bombs dropped from aeroplanes. See **TORPEDO; SUBMARINE**.

Wart Hog, a particularly ugly animal of the Swine Family, living in

Africa where it subsists upon roots dug with its long, sharp tusks. Its head is large and heavy and on each side of the nose are two prominent, wartlike bunches. The legs are much like those of common swine, but its long, thin tail, with bristles upon each side, is generally carried stiff and straight in the air, giving the animal a ludicrous appearance.

War'wick, R. I., a town of Kent Co., 5 m. s. of Providence, on the west side of Narragansett Bay and intersected by the Pawtuxet and Providence rivers, and on the New York, New Haven & Hartford and other railroads. Electric railways connect with many of the villages which are included within the corporate limits of the town. The larger villages are Natick, Pontiac, River Point, Centreville, Phoenix, Crompton, Apponaug, Warwick Neck, Oakland Beach, Buttonwoods, Conimicut and Long Meadow, all of which are summer resorts. Warwick has important manufacturing interests. The chief industrial establishments include flour and grist mills, wheelwright and blacksmith shops, woolen and cotton mills and manufactories of various kinds of textile products. Warwick was originally called by the Indian name of Shawomet, but the name was changed in honor of the Earl of Warwick in 1648. It was the birthplace of Nathanael Greene. Pop., 1920, 13,481; State census, 1925, 18,273.

Warwick, Wor' ik, Richard Neville, EARL OF (1428-1471), popularly known as "The Kingmaker," the eldest son of the Earl of Salisbury. He became the most powerful noble in England by marrying Anne, daughter and heiress of the Earl of Warwick, and thus received the Warwick title. He was the most conspicuous figure in the Wars of the Roses, during which he supported the Duke of York, and following his victory at St. Albans, in 1455, he received the government of Calais, which was then considered the most advantageous appointment in Christendom. Moreover, he was given command of the fleet for five years, and landing in Kent in 1460, in a year's time succeeded

in placing Edward IV on the throne, in place of Henry VI. Warwick and Edward soon quarreled, however, because of the latter's sudden marriage with Elizabeth Woodville, instead of with the sister-in-law of Louis XI of France, and in consequence, seeing that Warwick "could pull down as well as set up kings," he caused Henry VI to resume the sovereignty. Edward gave battle to Henry's army, under Warwick, at Barnet, Apr. 14, 1471, and the great Earl was left dead on the field.

Wash'burn, Cadwallader Colden (1818-1882), an American soldier, politician and capitalist, born in Livermore, Me. Early a land surveyor, he removed to Iowa in 1839, later settling in Illinois, where he studied law, and in Wisconsin, where he began to practice. Independent of his practice he amassed a fortune in lumbering and in flour milling. After 1854 he served three terms in Congress as an anti-slavery man. Shortly following the attack on Ft. Sumter he raised the Second Wisconsin Cavalry, of which he became colonel, and in December, 1861, successively led an expedition from Helena, Ark., into Mississippi. As major-general of volunteers, he headed a division of the Army of the Tennessee, was efficient as a division commander about Vicksburg and later distinguished himself under Banks in Louisiana. In May, 1865, he left the service. Two years later he again entered Congress and in 1872 was chosen governor of Wisconsin. Besides liberally patronizing education, Governor Washburn established an orphan asylum at Minneapolis and presented the University of Wisconsin with an astronomical observatory.

Washburne, Elihu Benjamin (1816-1887), an American statesman, born at Livermore, Me. Successively a printer, a teacher and the editor of the *Kennebec Journal*, he studied law at Kent's Hill Seminary and at Harvard, and in 1840 was admitted to the bar. He began to practice in Galena, Ill. Identifying himself with the Whigs, he served in Congress continuously from 1853 to 1869,

earning the title of "Watchdog of the Treasury." He was responsible for Grant's appointment as brigadier-general, and when the latter became president he appointed Washburne secretary of state. Washburne soon resigned, however, to accept the post of minister-plenipotentiary to France, which position he retained during the Franco-German war. In this capacity, as German agent in Paris, his work was characterized by marked diplomacy. In 1887 there appeared his *Recollections of a Minister to France*.

Washington, THE EVERGREEN STATE, one of the Pacific States, in the extreme northwestern part of the United States, is bounded on the n. by British Columbia and the Strait of Juan de Fuca, on the e. by Idaho, on the s. by Oregon and on the w. by the Pacific Ocean. The northwest corner is indented by the Gulf of Georgia and Puget Sound, and the Columbia River forms most of the southern boundary.

SIZE. The greatest length from east to west is 360 m., and from north to south 240 m. The area is 69,127 sq. m., of which 2291 sq. m. are water. Washington is a little smaller than Oklahoma or Missouri, about one and a half times the size of Louisiana and the 19th state in area.

POPULATION. In 1920 the population was 1,356,621; from 1910 to 1920 there was a gain in population of 214,631, or 18.8 per cent. The state has an average of 20.3 inhabitants to the square mile and is the 30th in the Union in population.

SURFACE. Washington is divided into seven quite distinct surface regions, the most conspicuous of which is the region of the Cascade Mountains, crossing the state in a slightly southwesterly direction about 40 m. west of the center. At the southern boundary these mountains are about 50 m. wide, but the ranges expand as they extend north, and at the northern boundary they have a width of 100 m. Their average altitude is about 8000 ft., but they contain numerous snow-capped peaks ranging from

9000 to 14,000 ft. in altitude. The most conspicuous of these are Rainier, or Tacoma, 14,408 ft.; Adams, 12,470; Baker, 11,100; St. Helens, 9750; and Stuart, 9470. The intervening valleys carry many clear and rapid streams.

The northeastern part of the state includes the Okanogan Highlands, which extend eastward from the Cascade Mountains to the Idaho boundary and south to the Columbia and Spokane rivers. This region is characterized by a rolling surface with gentle slopes and wide river valleys.

South of the Okanogan Highlands and extending to the Snake River, is the Columbia River Basin, the largest of the seven surface divisions, and because of its size often called the Inland Empire. The river is from 500 to 600 ft. above the sea, and from this level the plain gradually rises to altitudes of 1000 and 2000 ft. The western part of the plain is penetrated by spurs from the Cascade Mountains. This basin is an important agricultural region. The third surface region east of the mountains includes the southeast corner of the state, and its most striking feature is the Blue Mountains, whose highest peaks exceed 7000 ft. above sea level. This region is well watered and timbered.

The Olympic Peninsula contains that part of the state lying between the Strait of Juan de Fuca, Puget Sound and the Pacific Ocean, as far southward as Gray's Harbor. The Olympic Mountains form the chief characteristic of this region. Mt. Olympus, the highest peak, has an altitude of 8131 ft. Other peaks range in altitude from 7000 to 8000 ft. This region is heavily timbered.

Lying between the Olympic Peninsula and the Cascade Mountains is the Puget Sound Basin, in the center of which is the great inland sea, Puget Sound, with more than 2000 m. of coast line, and extending from British Columbia as far south as Olympia. The surface descends from the mountains on either side to the Sound, by gentle slopes.

South of Gray's Harbor and Puget Sound, and occupying the southwestern corner of the state, is the lower Columbian region. The surface is characterized by low mountains and hills, with broad intervening valleys. Much of the region is heavily timbered.

RIVERS AND LAKES. The Columbia River and its tributaries drain all the state east of the Cascade Mountains and also the southern part of the Puget Sound Basin. This magnificent stream enters the state from British Columbia about 18 m. west of the eastern boundary, flows in an irregular course, then turns westward and forms the boundary between Washington and Oregon. The chief tributaries from the east are the Pend Oreille, the Spokane and the Snake rivers. Those from the north are the Okanogan and the Methow; from the west, the Wenatchee and the Yakima (See COLUMBIA RIVER). The northwestern part of the state is drained by a number of short streams flowing into Puget Sound and the Pacific Ocean.

Washington contains a large number of mountain lakes noted for their scenery, clear water and great depth. The most important of these is Lake Chelan in Chelan County. This lake lies between two ranges of the Cascade Mountains and is 50 m. long and from 1 to 4 m. wide. Its greatest depth is 1400 ft.

SCENERY. Rolling plains, lofty plateaus, snow-capped mountains whose gentle slopes are clothed with verdant forests, sparkling streams fed by mountain snows, beautified by cascades and cataracts and flowing through canyon-like gorges, magnificent rivers, charming lakes, and one of the most beautiful and extensive inland seas in the world form the most striking features of the scenery of the Evergreen State. "Magnificent in its proportions, wonderful in its variety, grand and imposing in form and feature, picturesque and enticing," the scenery of Washington attracts tourists not only of the United States but of foreign lands as well.

CLIMATE. The Cascade Mountains divide the state into two distinct climatic

regions. That portion west of the mountains is characterized by an even temperature and heavy rainfall. Along the coast the thermometer never rises above 92° or falls below 10°. The annual mean for this region is about 50°; in the Chehalis Valley and south the temperature is somewhat higher. On the western slope of the Olympic Mountains the rainfall is from 60 to 120 inches, the heaviest in the United States; in the Puget Sound Basin it is from 25 to 60 inches, being lightest on the northeast slope of the mountains. The entire region west of the Cascade Mountains has two seasons, winter and summer, also known as the wet and dry seasons. Winter is the wet season, and about three-fourths of the rain falls from November to April.

The region east of the mountains has a continental climate with a greater range of temperature and lighter rainfall, since the winds lose most of their moisture in passing over the mountains. On the Okanogan Highlands and the eastern foothills of the Cascades the rainfall is from 12 to 24 inches, but in the southeastern counties it is from 6 to 12 inches, and here little or no rain falls during the summer. There are heavy snows in the mountains, and over a large part of eastern Washington the snowfall averages 40 inches. In July the temperature may rise to 100° or more, and in winter it may fall as low as 30° below zero, but owing to the dryness of the atmosphere these extremes cause no special inconvenience. Eastern Washington is arid, and in many localities irrigation is necessary to agriculture.

MINERALS AND MINING. Extensive deposits of bituminous and lignite coal occur in the Puget Sound Basin, and coal mining is one of the important industries of the state. The chief mines are in Kittitas, Pierce, Lewis, King and Thurston counties. Anthracite occurs in Pierce County near Mt. Rainier. The total yearly output of coal for the state is about 4,000,000 tons, and about 50,000 tons of coke are annually manufactured.

Gold, silver, copper, lead and other metals are mined in paying quantities, and as soon as transportation facilities are increased, these metals will be mined on a much larger scale. The most important gold mines are in Stevens County; those in Ferry, King and Okanogan counties rank next. Okanogan County leads in the output of copper, and King County in the output of lead. Iron ore, nickel, zinc and arsenic occur in the state. There are also extensive deposits of petroleum; and granite and other building stones are widely distributed. The mineral wealth of Washington is extensive, and for many years it will be a constantly increasing means of revenue and a valuable source of prosperity to the state.

FORESTS AND LUMBER. All of Washington west of the summit of the Cascade Mountains is forest land, and in the Olympic Peninsula and southward, including western Oregon, is the most dense forest in the United States and probably in the temperate regions of the world. Trees 7 and 8 ft. in diameter and over 300 ft. in height are common, and some trees even larger than these are found. The Douglas fir or Oregon pine predominates. Other species of importance are spruce, hemlock, cedar and yellow pine. The forests become less dense and the trees are smaller as one proceeds up the mountains, until the tree line is reached. Less dense forests are also found on the eastern slopes of the Cascades and in the extreme southeastern part of the state. The United States Government has established a number of forest preserves within the state, the most important being the Olympic, the Mt. Rainier and the Washington. The combined area of forest preserves in the state is about 19,000 sq. m.

Next to agriculture lumbering is the most important industry of the state, and with its allied occupations furnishes employment to over 100,000 men. Sawmills are planted throughout the forest regions, and some of them are the largest establishments of their kind in the

world. The state now ranks first in the production of lumber, and the value of the yearly output exceeds \$40,000,000 (See LUMBER).

AGRICULTURE. The diversity of soil and climate afford opportunity for a wide range in agricultural products, and Washington is making rapid progress along many lines of this important industry, which has become the leading one of the state.

Soil. West of the Cascade Mountains the soil has been formed largely by the action of ice and water; on the uplands it is generally a mixture of gravel and clay, which disintegrates with successive tillage; along the streams and on the lowlands the soil is composed of silt and alluvium; east of the mountains the soil is formed by the disintegration of volcanic rock and partakes of the nature of a clay loam, being very fine and of a high degree of fertility. In some parts of the Columbia Plain dry farming is practiced with great success; in other regions the water is supplied from systems of irrigation (See DRY-FARMING; IRRIGATION).

Products. Wheat is the most valuable crop, and the annual yield exceeds 35,000,000 bushels. Then follow oats, barley, rye and corn in the order of production. Most of the cereals are raised in the eastern part of the state. Potatoes are very successful in the irrigated valleys of this part of the state and in the alluvial soils west of the mountains; root crops, garden vegetables and bulbs also thrive in these localities. In the Wenatchee, Yakima and other valleys east of the mountains are extensive orchards, and this region is becoming noted far and wide for its production of apples, peaches and pears. The clear, dry atmosphere and large number of sunny days adapt these regions to the production of fruit of excellent quality. West of the mountains small fruits are raised in large quantities. Alfalfa and other forage crops are also important in nearly all localities. Hops are raised in both the eastern and western parts of the state.

The abundance of pasturage and the ease with which forage crops can be grown in nearly all parts of the state make the raising of live stock profitable, and the markets are being supplied with constantly increasing numbers of horses, cattle, sheep and hogs. Poultry is in great demand and barnyard fowls are found on nearly every farm. In some localities the keeping of bees has become worthy of mention, and all parts of the state west of the Cascade Mountains are suited to dairy purposes.

FISHERIES. The lakes and streams abound in fish, but the most important fisheries are confined to Puget Sound and the coast waters of the Pacific. The packing and canning of salmon is the principal branch of this industry. Halibut, cod, salmon and other fish are brought to Puget Sound ports from Alaska for canning and packing. The cultivation of oysters is assuming importance, the chief beds being in Willapa Bay, Gray's Harbor and Puget Sound.

MANUFACTURES. Lumbering and lumber products constitute the bulk of the manufactures. In the western part of the state the manufacture of dairy products is of importance, and other industries worthy of mention include meat packing, fruit and vegetable canning; flour and other gristmill products, and of machinery and building supplies.

TRANSPORTATION AND COMMERCE. Willapa Bay and Gray's Harbor furnish good harbors on the Pacific coast, and the latter has an extensive lumber trade. Puget Sound has numerous excellent harbors, and on two of these are located the great commercial centers of the state, Seattle and Tacoma. Olympia, Bellingham, Port Townsend and Port Angeles are thriving Puget Sound ports. These great natural harbors early attracted transcontinental lines of railway, and the Northern Pacific, the Great Northern and the Chicago, Milwaukee & Puget Sound lines all enter Seattle and Tacoma over their own tracks, while the Canadian Pacific and the Union Pacific enter over the tracks of other roads.

The Northern Pacific and the Great Northern railways enter the state east of Spokane. The former makes a detour toward the south and enters Seattle by a circuitous route. The Great Northern crosses the center of the state in a nearly straight course. Between these and running nearly parallel to the Great Northern is the Chicago, Milwaukee & Puget Sound line. The Oregon Railway and Navigation Company has a line entering the southeastern part of the state and extending northward to Spokane, and the Great Northern has a line extending from Spokane in a northwesterly direction to British Columbia. Spokane is the great railway center of eastern Washington, and from it lines radiate in nearly all directions. The Great Northern, the Northern Pacific and the Oregon Railroad and Navigation Company have lines extending north and south through the Puget Sound Basin and connecting with the main lines, which have their terminals in Seattle and Tacoma. In many localities electric lines connect near-by cities and towns, and these are being extended each year.

Ocean vessels of the largest size enter the harbors of Seattle and Tacoma, and in the ports of these cities the products of the world are exchanged. The most extensive trade is with Alaska, Hawaii and the Philippine Islands, but a good trade is carried on with China, Japan and other countries of the Orient. There are numerous small steamers plying between the ports on Puget Sound and the Pacific coast. Large quantities of fruit and lumber are exported to other states.

GOVERNMENT. The constitution adopted in 1889 has received several amendments, the last in 1910. An amendment must be approved by two-thirds of the members of each branch of the Legislature and by a majority vote of the people at the election following its proposal. The right to vote is conferred equally upon men and women. General elections are held biennially. The governor, lieutenant-governor, secretary of state, treasurer, auditor, attorney-general, superintendent of public in-

struction and commissioner of public lands are elected for a term of four years. The Legislature consists of a Senate and a House of Representatives. The number of senators cannot be more than one-half nor less than one-third the number of representatives. Senators are elected for four years, and representatives for two. The Legislature meets in odd-numbered years.

The courts consist of a Supreme Court, Superior Courts and local courts, the last presided over by justices of the peace. The Supreme Court consists of nine judges elected for a term of six years. Superior Courts are presided over by judges elected for a term of four years. There must be one court for each county or one for two or more counties united. These courts have jurisdiction over most of the legal matters coming before County Courts. Justices of the peace are chosen in each election precinct for a term of two years.

The county officers consist of three commissioners, clerk, treasurer, auditor, assessor, attorney, engineer, sheriff, coroner and superintendent of public schools, each elected for a term of two years.

EDUCATION. The public schools of the state are under the immediate charge of a superintendent of public instruction and a state board of education. The state superintendent is elected for a term of four years, and the board of education consists of the state superintendent, the president of the University of Washington, the president of the State College of Washington, the principal of one of the state normal schools and three other members appointed every two years by the governor. It is the duty of this board to fix the course of study for the elementary schools, high schools, normal schools and normal departments of the state university and college, and to approve the requirements for entrance to the University of Washington.

In addition to its county superintendent each county has a board of education consisting of the county superintendent and four other members ap-

pointed by him. The state has a compulsory education law, and all children under 15 are required to attend public or private schools during the time said school is in session, unless excused because of illness or other disability, or unless they have completed the branches taught in these schools. The University of Washington is at Seattle, and the State College, which includes the agricultural college, is at Pullman. State normal schools are maintained at Bellingham, Cheney and Ellensburg. The most important of the higher institutions of learning not under control of the State are Whitman College at Walla Walla, Gonzaga and Whitworth colleges at Spokane, and the College of Puget Sound, at Tacoma.

STATE INSTITUTIONS. The Western Washington Hospital for the insane is at Steilacoom and the Eastern Hospital at Medical Lake. The schools for the deaf and blind are at Vancouver. The State Custodian School is located near Medical Lake. The Washington Soldiers' Home and Soldiers' Colony is at Orting; the veterans' home at Port Orchard. The state penitentiary is at Walla Walla, the state reformatory at Monroe and the state training school at Chehalis.

CITIES. The chief cities are Olympia, the capital; Seattle, Tacoma, Spokane, Walla Walla, Ellensburg, Everett, Bellingham, Yakima, Port Townsend, Aberdeen, Centralia and Wenatchee.

HISTORY. Washington was formerly a part of the Oregon country, and for its early history see OREGON, subhead *History*. The Territory of Washington was formed in 1853, and the discovery of gold led to a large increase in the white population. This alarmed the Indians, and for the next three years there were numerous Indian outbreaks. The population increased slowly until after the completion of the Northern Pacific Railway in 1884. An enabling act, providing for the admission of the territory as a state, was passed in 1889, a constitution was adopted and the territory was admitted during that year. In recent years the development of the state has

been phenomenal. The Alaska-Yukon Exposition was held at Seattle in 1909.

GOVERNORS. Elisha P. Ferry, 1889-1893; John H. McGraw, 1893-1897; J. R. Rogers, 1897-1901; Henry G. McBride, 1901-1905; Albert E. Mead, 1905-1909; Samuel G. Cosgrove, 1909; M. E. Hay, 1909-13; E. Lister, 1913-21; Louis F. Hart, 1921-25; R. H. Hartley, 1925—.

Washington, D. C., capital city of the United States, coextensive with the District of Columbia, 225 m. s.w. of New York City, 135 m. s.w. of Philadelphia and 40 m. s.w. of Baltimore, at the head of tide and navigation of the Potomac River, 130 m. from Chesapeake Bay and 185 m. from the Atlantic Ocean, on the Pennsylvania, the Southern, the Baltimore & Ohio, the Chesapeake & Ohio, the Washington, Alexandria & Mt. Vernon, the Washington, Baltimore & Annapolis, the Washington Southern and other railroads. The Potomac River affords water transportation to all Atlantic seaboard ports. At Old Point Comfort and Norfolk, there is connection with steamers for New York, and there are various direct lines of steamers to Boston, Baltimore and Philadelphia. There is ferry service hourly to Alexandria. The street-car system is extensive and connects at Georgetown with interurban lines up the Potomac Valley to Cabin John Bridge, Great Falls, Rockville and Tennallytown. Other suburban lines reach Brookland, Hyattsville, Bladensburg and adjoining towns and cities. There is a new electric line to Baltimore and Annapolis, Md., and fast electric trains to Mt. Vernon, Alexandria and Arlington. The boundaries of the city are only limited by the boundaries of the District, which was originally 100 sq. m.; about one-fourth of this area was ceded back to Virginia before the Civil War. Originally the city proper was embraced between two tributaries of the Potomac, the Anacostia River on the east and Rock Creek on the west, the latter separating it from Georgetown. In proportion to the population, the city's commerce and manufactures are relatively small, printing and publishing and the production

of gas, malt liquors and bakery products being among the chief industries.

STREETS, PARKS AND BOULEVARDS. Washington contains about 462 m. of streets, the greater portion of them being wide, smooth and delightfully shaded. The original plan of the city as prepared by Maj. Pierre Charles L'Enfant, a French engineer, in 1791, has, in the main, been preserved. The avenues were named in a certain order after the states. The great central avenue was named Pennsylvania Avenue by reason of this state's central position as the "Keystone State." The avenues which cross Pennsylvania were named after the Middle States—Maryland, Delaware, New Jersey and New York. The avenues south of Pennsylvania were named after the Southern States. The streets running east and west are known by the letters of the alphabet. The streets bearing numbers are at right angles to the alphabetical streets. This divides the city into four quarters, Northwest, Northeast, Southeast and Southwest, these divisions being formed by the lines running north and south and east and west throughout. Triangular, square or circular plots of green, embellished with flowers and beautiful trees, are at most intersections of streets and diagonal avenues. The larger parks are the Mall, connecting the Capitol with the Washington Monument; the Potomac Park of 739 acres, which has been reclaimed from the Potomac River; and the Great Rock Creek Park of 1600 acres, which, joining with the Zoological Garden, extends along Rock Creek from Connecticut Avenue north to the District bounds. The National Zoological Garden of 170 acres, with its notable collection of the world's fauna, is under the control of the Smithsonian Institution. Lafayette Square was the name selected by Washington himself for the square in front of the Executive Mansion. Over 5600 acres in the District of Columbia are devoted to parks and squares, and all are under the care of the Federal Government. In 1901 a commission was appointed, by authority of the United States Senate, to prepare

plans for the development of the city, and this body submitted a comprehensive and artistic project to carry out the original plans of L'Enfant and Washington. Steps in this direction have been taken by Congress in locating new buildings for the Senate and House of Representatives, the department of agriculture and the National Museum. In the location of the Union Station, removing it from the center of the Mall, where it destroyed one of the most attractive parks; in the location of the Bureau of the American Republics, and in the home of the Daughters of the American Revolution, these plans have been followed. Congress has authorized the erection of three great new department buildings—of State, Commerce and Labor and Justice in accordance with this plan. The great memorials to Grant and Lincoln are now being erected on the sites selected for them in the Park Commission's report. The moral effect of this report has secured the reclamation and future parking of the Anacostia River, and Rock Creek Valley between what was Georgetown and Washington.

MONUMENTS. Among the city's many monuments, foremost is that erected to the memory of Washington. This monument, 55 ft. square at the base and 555 ft. in height, is a plain obelisk of white Maryland marble. This monument was completed in 1884 at a cost of \$1,300,000 and was designed by Robert Mills. The work was begun in 1848 by popular subscription funds under the direction of the Washington National Monument Society, but after 1877 the work was carried on by an appropriation made by Congress. Other conspicuous monuments include the Naval, or Peace, Monument, designed from a sketch by Admiral Porter, on Pennsylvania Avenue, near the western entrance to the Capitol grounds; the Garfield bronze statue on Maryland Avenue, designed by J. Q. A. Ward; the Rawlins statue, designed by J. Bailey; the Franklin statue on Tenth Street; the equestrian statue of President Andrew Jackson, by Clark Mills; the heroic bronze statue of Marquis de Lafayette

in Lafayette Square; and the equestrian statue of Maj.-Gen. George Henry Thomas, by J. Q. A. Ward, in Thomas Circle. One of the most artistic statues in the city is that erected by the Lutheran Church of America to Martin Luther. An equestrian statue of James B. McPherson, by Robisso, graces McPherson Square. Other prominent statues are the statue of Gen. Winfield Scott, modeled by H. K. Brown; the statue of Farragut, by Vinnie Ream Hoxie, in Farragut Square; the Gen. Philip Sheridan equestrian statue, by Borglum; the statue of Frederick the Great, presented to the United States by Emperor William II of Germany; and a statue of General Sherman, by Carl Rohl-Smith, near the Treasury Building. The extensive and beautiful grounds of the Soldiers' Home are also adorned by statues.

PUBLIC BUILDINGS. The Capitol of the United States stands in a stately inclosure of 46 acres on a slightly hilltop nearly 100 ft. above the Potomac River. The corner stone of the building was laid Sept. 18, 1793, and the original building was completed in 1827 at a cost of about \$2,500,000. During later years various improvements, additional ground space and decorations have brought the cost of the Capitol to a sum approaching \$15,000,000. The Capitol is 751 ft. long, 350 ft. in greatest width and covers nearly four acres of ground. The iron dome, which replaces the early wooden dome, weighs nearly 4000 tons and was completed in 1865. "The huge dome," says a writer, "rising in its classic beauty far above the main building is a fitting crown to the noble edifice." This dome cost \$1,500,000. Surmounting the dome is the bronze Statue of Liberty, designed by Crawford, costing \$24,000.

The architecture of the Capitol is Italian Renaissance; the central portion, or old Capitol, is built of Potomac sandstone; the architects were William Thornton, Benjamin Latrobe and Charles Bulfinch. The wings of marble and the new dome of cast iron were designed by Thomas U. Walter. The newer wings are built of Massachusetts marble. A broad

plaza stretches in front of the building. The southern wing contains the House of Representatives, and the northern wing the Senate Chamber. The grand central portico is 160 ft. wide and is adorned with pieces of colossal statuary in marble. The inauguration of presidents has taken place on this portico since the time of Jackson, the seventh president of the United States. Among the many interesting objects about the Capitol is the great bronze door, 19 ft. high, designed by Randolph Rogers, which was cast in Munich by Von Muller, who received \$17,000 in gold. The rotunda is 96 ft. in diameter and 180 ft. high to the canopy, the painting of which was Brumidi's masterpiece. The big historical paintings are all by American artists and fall into two classes, early historical and Revolutionary. The old Hall of Representatives is now used as a hall for memorial statuary.

The Library of Congress, designed by Smithmeyer and Pelz, architects, is one of the most magnificent buildings of its kind in the world, having a wealth of beauty of architecture and interior decoration. It possesses a collection rich in history, jurisprudence, science, books and periodicals—in all nearly 2,000,000 volumes. The style is Italian Renaissance modified, and its interior is the most artistic of all the magnificent buildings at the Capitol. The cost was about \$6,000,000. There are 34 governmental libraries in Washington open to the public, exclusive of the Carnegie library and the libraries of private institutions and associations.

The Executive Mansion, more commonly known as the White House, is the official residence of the president and was the first public building to be erected in Washington. The building is of Virginia sandstone, two stories in height and 170 ft. long. It was built in 1792-99, from designs by James Hoban. In 1814 the British set fire to the building, and when it was restored, four years later, the building was painted white to cover the ravages of fire. The cost of the White House exceeds \$1,500,-

000. The interior of the White House in 1903 was restored to its former beauty and dignity in a masterly way, by McKim, Mead and White. The president's room and cabinet room, built in 1902-03, are in the executive office west of the presidential mansion. The Treasury Building, east of the White House, the oldest of the departmental buildings, is an imposing granite edifice 510 ft. long and 280 ft. wide. The State, War and Navy Building, a towering mass of granite west of the White House, on 17th Street, covers over four acres and cost \$10,700,000. The Post Office Building, containing the general department and city post office, is modified Romanesque in style. The nine upper floors are devoted to the business of the postmaster-general. Among the many important buildings are the Patent, Pension and Census Office buildings; the Land and Indian offices; the Government Printing Office; the Bureau of Engraving and Printing; the city hall; municipal building, costing \$2,500,000; District Courthouse; United States Naval Observatory, from which Washington time is telegraphed daily to all parts of the United States; Masonic Temple; and the magnificent new Union Railway Station, designed by Burnham. West of Georgetown are the headquarters of the United States Weather Bureau.

MUSEUMS AND ART GALLERIES. The Smithsonian Institution (See SMITHSONIAN INSTITUTION) is built of Seneca brownstone and was completed in 1855. It has under its charge five important bureaus. Other museums include the National Museum, Freer Art Museum, Agricultural Museum, Army Medical Museum, Carnegie Institution and the Bureau of Fisheries. The beautiful Corcoran Art Gallery on 17th Street was founded and endowed by William Wilson Corcoran "for the perpetual establishment and encouragement of the Fine Arts."

EDUCATIONAL INSTITUTIONS. Washington is a noted educational center. The five great universities are George Washington University, nonsectarian, opened in 1821; Georgetown University,

(Catholic), which includes schools of law, medicine and dentistry; Catholic University, which stands at the head of the Catholic schools in America; the American University, under Methodist control; and Howard University for the higher education of negroes. There are three colleges—Gallaudet College for the deaf, Gonzaga and St. John's—and several academies and seminaries. In the high school division there are besides the classical high schools, business and technical high schools. A school of art is also maintained in the Corcoran Gallery of Art.

CHARITIES. There are a large number of charitable and correctional institutions throughout the city. Those under government or District of Columbia control include the United States Naval Hospital, Freedmen's Hospital, Soldiers' and Sailors' Temporary home, Hospital for Insane, Industrial Home School and reform schools for boys and girls. The National Soldiers' Home, founded in 1851, by Gen. Winfield Scott, comprises five buildings and 512 acres of beautiful grounds. This home cares for 800 retired or disabled soldiers. The Lutheran Eye, Ear and Throat Infirmary, the Providence and Episcopal hospitals, Columbia Hospital for women, children's and foundlings' hospitals, Home for the Aged, Home for Incurables and Methodist, National Lutheran and Baptist homes are among the many private institutions.

CHURCHES, CLUBS AND THEATERS. Washington contains a large number of churches of all denominations as well as several national church headquarters. Among the oldest churches are the Rock Creek, Christ Church, St. John's and St. Aloysius. Others include St. Matthew's, First Church, Gurley Memorial, Church of the Covenant, Metropolitan Memorial, All Souls, Calvary, and Washington Cathedral. Among the clubs are the Metropolitan, Army and Navy, Cosmos, and Chevy Chase. Leading theaters include the Belasco, New National Academy of Music, Chase's Grand Opera House, and Columbia. The city is also the headquarters for many learned societies.

CEMETERIES. Adjoining Ft. Meyer, on the opposite side of the Potomac in Virginia, lies Arlington, a National cemetery, in which lie buried over 21,000 soldiers, killed in the Civil War and in the war with Spain. Near the grounds of the Soldiers' Home is a National Military cemetery containing the graves of 7220 soldiers. The Congressional cemetery is on the bank of the Anacostia River. Other cemeteries include Glenwood, Prospect Hill, Oak Hill, Rock Creek, St. Mary's and Harmony cemeteries.

GOVERNMENT. The Federal Congress governs Washington. The executive government of the city, under the act of Congress of June, 1878, is a board of three commissioners, appointed by the president (See DISTRICT OF COLUMBIA). The people have no representation in Congress, no voice in the government of the city, do not cast a vote for the president, nor can they sue or be sued in the Federal courts. Three-fourths of the expenses are paid by the District and about one-fourth by the United States Government under a lump sum plan. The District revenue is paid into the Federal Treasury, and all accounts are audited by the treasury department. The commissioners appoint officers and employees of the District Government. Estimates of the money needed for municipal purposes are sent to Congress by the commissioners of the District, and an appropriation is based on these estimates.

HISTORY. The country had no permanent capital after the Revolutionary War, and there was considerable rivalry among various cities to secure the seat of government. The states of Maryland and Virginia promised cessions, and Washington was known to favor a site on the Potomac River. By act of March 30, 1791, Washington was authorized to select a site anywhere along the Potomac between the Eastern Branch, or Anacostia, and the Conococheague rivers. Major L'Enfant drew the city's plans, and Andrew Ellicott laid it out. In the same year Columbia was adopted for the District and the name Washington for the

city. In 1871 vast improvements were effected in the city. Georgetown was annexed in 1878. Population, about 500,000. Consult: Varnum, *The Seat of Government of the United States*; J. A. Porter, *The City of Washington, its Origin and Administration*; Howard, *Washington as a Center of Learning*; R. R. Wilson, *Washington, the Capital City*; and Tindall, *Origin and Government of the District of Columbia*; Bryan, W. B. *A History of the National Capital*.

Washington, Booker Taliaferro (about 1858-1915), an American negro educator, founder and principal of the largest and most influential school in the world for people of his race (See **TUSKEGEE NORMAL AND INDUSTRIAL INSTITUTE**). He was born a slave, near Hale's Ford, Va.; with his mother removed to Malden, W. Va., shortly after emancipation; and, while working in salt and coal mines, acquired the rudiments of an education by attending night schools and by more continuous study during the winter months.

In spite of many hardships he succeeded in working his way through Hampton Institute, from which he graduated in 1875 with the highest class-honors. He subsequently taught at Malden, his former home; completed a course of study in Wayland Seminary at Washington, D. C.; and, as a teacher in Hampton Institute, was highly successful in directing the work of the Indian pupils, and in the night schools. His efforts to better the condition of Tuskegee Institute led to his appearance at many important public assemblages, religious and secular, in both the North and South, and his addresses soon made him known as a remarkably fluent and effective speaker on educational and economic questions. He became known not only as a man who was tremendously in earnest, but as a far-sighted and practical reformer. He received an honorary M.A. from Harvard in 1896 and an LL.D. from Dartmouth in 1901. He is the author of *The Future of the American Negro, Up From Slavery* (his autobiography), *Working With the Hands, Character-Building, Putting the*

Most into Life and The Negro in Business.

Washington, George (1732-1799), commander-in-chief of the American forces in the Revolutionary War, and first president of the United States. John and Lawrence Washington, connected with the ancient and noble family of Sulgrave Washingtons, came to Virginia from England in 1658 and purchased extensive lands in the "Northern Neck," lying between the Potomac and Rappahannock rivers. John located on Bridges' Creek, in Westmoreland County, where he became a substantial planter and a member of the House of Burgesses. He was the great-grandfather of George Washington, and built the old plantation house in which the latter was born on Feb. 22, 1732, the oldest son of Augustine Washington and his second wife, Mary Ball. This house was burned three years after George's birth (the site is marked by a tablet), and the family removed to a farm on the Rappahannock, opposite Fredericksburg, where the lad's boyhood was spent.

BOYHOOD AND YOUTH. When George was 12 years old, his father suddenly died and his mother was left with six children to care for, and very scant means of support; for, while the father was well-to-do, the property was largely in the form of land, from which there was little cash income. George could not therefore be sent to England for his education, but received elementary instruction at home and in the poor common schools of the neighborhood. He was a thoughtful and studious lad, however, and profited by the good society in which the family moved, as is shown by his 100 maxims of conduct copied with great neatness at the age of 13. He was active and energetic, strong and athletic, loving enthusiastically the outdoor life of the Southern plantation, the surest rider and shot, the best runner and wrestler of any boy in the whole region.

At the age of 14 he decided to try the adventurous life of the sea, but was finally dissuaded by his mother. For nearly two years longer he continued his

VIEWS OF WASHINGTON, D. C.



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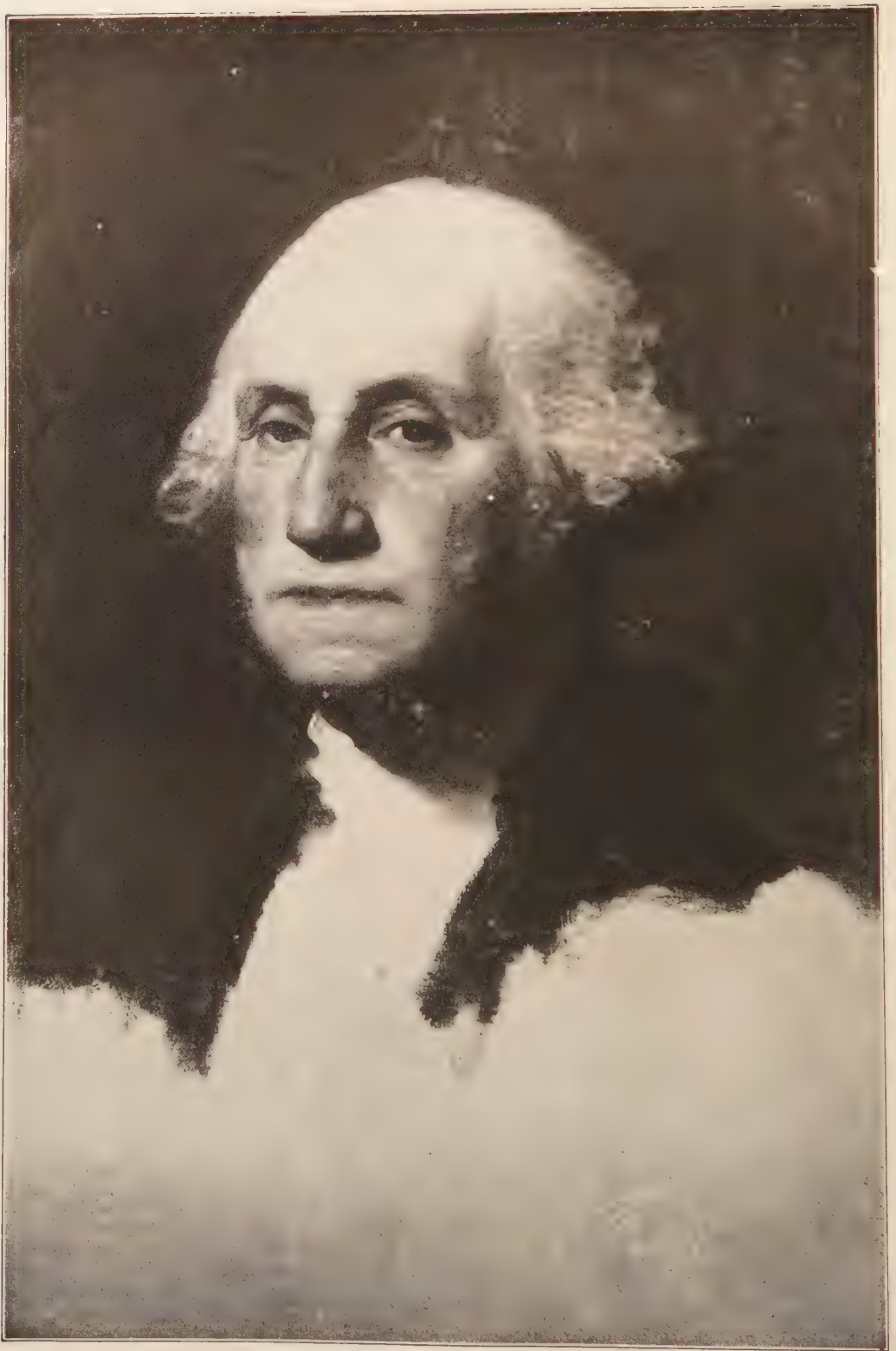
One of the most magnificent buildings of its kind in the world.



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EXECUTIVE MANSION

The home of the president and family, commonly known as the White House



GEORGE WASHINGTON

studies, developing the bold and handsome handwriting that was later to adorn so many important documents, and giving special attention to legal forms, mathematics and surveying. He then left school, and went to spend the winter at Mt. Vernon, the home of his older half brother and guardian, Lawrence, who was very fond of him. Here he formed the acquaintance of Lord Thomas Fairfax, who lived on a neighboring estate. Lord Fairfax took a great liking to the manly, fearless, straightforward young man, with whom he enjoyed many an exciting hunt and chase; and in the spring he sent him to survey his great landholdings beyond the Blue Ridge Mountains.

SURVEYOR. The work was performed so well that George was appointed official surveyor, and for three years he tramped the forests in this free life. No better training could have been devised for developing that iron constitution which later made it possible for him to undergo the hardships of the Revolutionary War and spend 48 hours at a stretch in the saddle, without sleep. Meanwhile his spare time was spent at Mt. Vernon and at Greenway Court, the wilderness lodge of Lord Fairfax, where he read to good purposes and received instruction in fencing and the art of war. He emerged from this period of his life a strong and muscular young man, approaching the great stature of six feet and two inches which he afterwards attained, with a well-proportioned figure, light brown hair drawn back from a broad forehead, an open and manly face with a square and massive jaw, and a general expression of restrained energy and power.

His brother Lawrence was now taken ill. George went with him on a trip to the West Indies in search of health, but in vain. He died in July, 1752, leaving his younger brother the responsibility of managing the plantation for his widow and daughter, a large undertaking for a young man of 20, which indicates the confidence reposed in him by those who knew him best. By the death of the

daughter several years later, Mt. Vernon became his permanent and much-loved home. About the time of his brother's death Washington was commissioned major in the Virginia forces and adjutant-general of one of the four military divisions into which the colony was divided, and threw himself with great enthusiasm into his new duties.

FRENCH AND INDIAN WAR. Meanwhile the struggle between France and England for the possession of North America was beginning. The French settlers had gone up the St. Lawrence, through the Great Lakes, and over into the Ohio and Mississippi valleys. The English pioneers were then penetrating the mountain passes and thus reaching the same region. The two nationalities came into conflict on the headwaters of the Ohio, and there followed what is known as the French and Indian War. In October, 1753, Governor Dinwiddie of Virginia sent Washington as an emissary to warn the French commander on the shores of Lake Erie against further trespassing on English territory. It was a difficult and perilous task, involving a journey of 600 miles through the wilderness in the winter; but he accomplished his mission with great judgment and courage, and, after several narrow escapes, returned home in safety.

The warning was in vain. An expedition was therefore sent out the following spring to occupy the outposts on the Ohio, and especially Ft. Duquesne at the junction of the Allegheny and Monongahela rivers. Washington was made lieutenant-colonel of this expedition. The sudden death of his superior officer, however, soon left him in sole command. He led his forces to the scene of action, defeated a detachment of the French in a preliminary skirmish, but was forced to capitulate to the main body of the French at Great Meadows, and marched his forces on honorable terms back to Virginia. The next year he accepted a position with the rank of colonel on the staff of General Braddock in a second expedition against the French. In the disastrous Battle of Monongahela, Wash-

ington conducted himself with great personal daring, and the defeat was largely due to Braddock's refusal to follow his wise counsel. He was now made commander-in-chief of the Virginia troops. These he proceeded to reorganize; made a journey on horseback to Boston to settle questions of military rank; led the advance forces that finally occupied Ft. Duquesne in 1758 and renamed it Ft. Pitt (now Pittsburgh); and resigned in December, 1758, when the war was practically over, returning to Mt. Vernon (See FRENCH AND INDIAN WARS).

During his last campaign he had been elected to the House of Burgesses, and upon his first appearance there he was publicly thanked for his services by order of the assembly. On Jan. 6, 1759, he married Mrs. Martha Custis, a beautiful and wealthy young widow, and for the next 15 years lived an ideal life at Mt. Vernon. In his own right and by his marriage, he had now become one of the richest men in the colony; and he gave his attention to the management of his large estates with the same thoroughness and vigor that had characterized his work as surveyor and soldier. He loved the hunt and the chase, and his hounds and thoroughbred horses were unsurpassed in the colony. He loved company and activity, and, since he had come out of the war one of the most prominent men in Virginia, Mt. Vernon became the center of wide and generous hospitality.

COMMANDER-IN-CHIEF—REVOLUTIONARY WAR. Washington was not so immersed in his private affairs, however, that he could not watch with apprehension the approaching struggle between the colonies and the Mother Country. He regarded armed resistance as the last resort, but was one of the first to see clearly that it would come to that sooner or later. In 1774 he went as one of Virginia's delegates to the First Continental Congress, in which Patrick Henry says of him, "If you speak of solid information and sound judgment, Washington is without question the greatest man on the floor." During the meeting of the Second Continental Congress the

following year, he always appeared on the floor of the house in the uniform of a Virginia colonel. When Congress was forced to organize the army that sprang up in a night around Boston after Lexington and Concord, Washington was unanimously appointed commander-in-chief of the Continental forces. He accepted with great diffidence, asserting his incompetence for the position and refusing any pay for his services except the return of his personal expenses at the end of the war. Proceeding at once to Boston, he took formal command of the army, July 3, 1775, under the now historic elm at Cambridge.

In the long struggle which followed, no more difficult task ever confronted a man than that which faced Washington. The colonists were a peace-loving people, without military experience or a military establishment. The army was an unorganized mob of patriots. The colonies were jealous of each other, the Continental Congress had no authority except what it could assume without protest, there were no military supplies and nobody to hold responsible for them, the army was enlisted for only three months at a time and must be continually re-created. The people were by no means unanimous in their desire to fight England, and indifference often reigned where enthusiasm was needed. Upon the commander-in-chief the brunt of the burden fell. He must not only lead an army against a disciplined enemy of superior numbers, but must also create the army and equip it, keep alive a spirit of determination that would not stop short of the final goal, preserve harmony among the colonies and secure efficiency in Congress.

The first military task was to drive the enemy from Boston, which was accomplished in March, 1776. The Revolution then had three centers of interest—the Valley of the Hudson, the control of which by the enemy would cut the colonies in two; the Middle colonies round about Philadelphia, the capital of the Confederation; and the Southern colonies. Washington planned the move-

ment in the northern Valley of the Hudson and Lake Champlain which resulted in the capture of Burgoyne's army in October, 1777. He also planned in a general way the campaign in the Carolinas and Georgia which led finally to hemming Cornwallis in at Yorktown. But personally he confined his operations chiefly to the middle section and the lower Valley of the Hudson. Failing to drive the British from New York, his aim was to confine them there as closely as possible, and prevent them from going up the Hudson or occupying the Jerseys. He kept his poorly-equipped army together by tremendous efforts, led them in the retreat through New Jersey, turned upon the enemy in swift attacks at Trenton and Princeton, and by degrees drove them back to New York. Frederick the Great called this the most brilliant military campaign of the century.

But there were long months and years of comparative inactivity, when all that he could do with the forces and resources at his disposal was to cling to his main idea of preventing the colonies from being cut in two. With the eye of a great tactician, he perceived that if this could be done, and he could keep an active army in the field, final victory was assured. At last his opportunity came. The British forces were divided between New York, Cornwallis at Yorktown and the army in the South. Making a demonstration against New York, and leaving part of his forces behind to keep Clinton there, Washington quietly and quickly marched the rest of his army southward and joined Lafayette and Greene before Yorktown. Cornwallis was prevented from escape by sea by the French allies under De Grasse, and was forced to surrender his entire army of over 7000 men on Oct. 19, 1781. The long war was practically ended.

After two more years of weary waiting, the Treaty of Paris was signed on Sept. 3, 1783, assuring the independence of the United States. Washington marched in triumph into New York City with his troops on Nov. 25, upon its

evacuation by the British. In a memorable scene on Dec. 4 he took leave of his officers. Two days before Christmas he appeared before Congress at Annapolis and resigned his command in the following words: "Having now finished the work assigned me, I retire from the great theatre of action; and bidding an affectionate farewell to this august body under whose orders I have so long acted, I here offer my commission, and take my leave of all the employments of public life." Leaving Annapolis he hastened with joy to his beloved home of Mt. Vernon, hoping to spend his remaining days in its tranquil occupations. (See REVOLUTIONARY WAR IN AMERICA).

PRESIDENT OF THE UNITED STATES. But this was not to be. His work was only half done. The colonies, whose independence he had won at such cost, must establish a united federal government of real efficiency, or what had been gained would be of no avail. Washington's experience more than that of any other man, made him realize this. Upon resigning his command he had addressed a letter to all the governors, emphasizing this truth. At Mt. Vernon he was constantly advocating it by correspondence and conversation. When the Constitutional Convention met, therefore, in 1787, his great influence required his attendance, and he was the unanimous choice for presiding officer. With a watchful eye and calm judgment, he guided the deliberations of this body; and after the Constitution had been adopted by the convention, the very fact that Washington approved it probably did more than anything else toward securing its ratification by the various states.

But even now he could not be permitted to retire in peace. The eyes of all men turned to him as the one who must launch the new government; and he was unanimously chosen first president of the United States under the new Constitution. Once more bidding a reluctant farewell to Mt. Vernon, he proceeded to New York, where Congress was then in session. It was a continuous

triumphal procession. Everywhere the people hailed him with enthusiastic and reverent welcome. When he reached the city he was received in state by Congress, and took the oath of office on April 30, 1789.

To the new and untried cares of government he brought the same spirit of thoroughness and determination that had hitherto characterized his life. Added to this were his wide grasp of public interests, his extended acquaintance with the leading men of the country and his immense personal prestige at home and abroad. He surrounded himself with a cabinet of eminent and able men. The finances of the nation were put upon a stable footing, amendments were adopted to the Constitution to meet objections that had arisen, relations with foreign nations were established and, in a word, the machinery of the new government was put into successful operation. Much against his wishes Washington was persuaded to continue in office for a second term, being again chosen by unanimous vote of the electoral college. Among the important events of his administrations were the admission of Vermont, Kentucky and Tennessee, the chartering of the first United States bank, the Indian wars in the Northwest Territory, the assumption of the state war debts by the Federal Government, the Whiskey Insurrection, and diplomatic entanglements with England and France (See *WHISKEY INSURRECTION*; *GENET, EDMOND CHARLES*; *JAY TREATY*; *UNITED STATES, subhead History*).

Declining a third election, Washington issued his famous farewell address to the people and retired to Mt. Vernon at the expiration of his term of office. War with France threatened, however, in 1798, and he was once more appointed commander-in-chief of the army, and turned his attention to its organization; but the cloud happily passed. When at last his public business permitted him to rest, his days of life were numbered. While riding over his plantation and supervising its work, he took a severe cold on Dec. 12, 1799, and died two days

later. With every mark of the respect and love of a grateful people he was buried at his beloved Mt. Vernon, which has become a fitting memorial of its great master. To this day bells are softly tolled as passing boats come opposite the tomb of Washington.

THE MAN. Washington was a noble figure to stand in the forefront at the beginning of a great nation's history. Of commanding presence, full of passion and enthusiastic fervor, he so thoroughly learned the lesson of self-control in the long school of experience that we think of him only as the calm and self-contained general and president. His purpose was undaunted by the greatest obstacles. His judgment was sane and balanced to a remarkable degree. His patriotism was boundless. As a general, circumstances prevented him from fighting with the impulsive dash that his fiery spirit urged, and made him the "American Fabius," retiring when he dared not risk his ill-equipped army in a fight, coming back again when the enemy ceased pursuit; but sticking with indomitable tenacity to the main issue.

The way in which he succeeded in overcoming the obstacles that confronted him during the Revolutionary War remains the marvel of men, and stamps him as being much more than a great general. This is doubly true when we take into consideration his insistence upon working by means of Congress. Cromwell wearied of the attempt to get things done through Parliament and dissolved it. Napoleon found the Directory in the way of efficiency and seized absolute control. Washington's difficulties were at least as great as those confronting either of these men, but he was determined to preserve republican institutions, even when he could have worked to better advantage unhampered. If his life had ended at the close of the Revolutionary War, his would have been a remarkable career, and would have given him lasting fame. That he performed the further task of inaugurating a new government with wisdom and launching a new nation in the world with success,

reveals the greatness to which he had grown, and marks him as a creative statesman.

But his greatest power lay in his character. Meeting the increasing responsibilities thrust upon him with honesty of purpose and unselfishness of spirit, he grew with them into a great and balanced man. The tributes that have been paid him are tributes to the man himself.

Washington and Lee University at Lexington, Va., was founded as the Augusta Academy in 1749. Some months before the declaration of July 4th, '76, the institution was rechristened as "Liberty Hall" and sent her sons to the aid of Washington.

After the revolution, the Father of His Country, after long consideration, endowed the Academy with \$50,000, and formally authorized it to bear his great name. The sons of the college fought the British again in 1812, helped conquer Mexico in '48, and in 1861 left the campus as the "Liberty Hall Volunteers."

At the close of the Civil War, the immortal Lee, having no money, gave himself to the institution founded by his great kinsman. For five years he poured his energies into its rebuilding and expansion, and set for all times its ideals of chivalry, courtesy, patriotism, and broad national spirit. At his death in 1871, the name of the institution was changed from Washington College to Washington and Lee University. Enrollment, 800.

There are four departments: the Schools of Law, Liberal Arts, Commerce, and Applied Science.

Washington, Martha (1732-1802), wife of George Washington, born in New Kent County, Va., daughter of Col. John Dandridge, a wealthy planter. She was married in 1749 to Daniel Parke Custis, and ten years later to George Washington. During the early part of her life with George Washington, their domestic affairs were seriously disarranged by the war. She accompanied her husband to New York City, Philadelphia and other points, rendering him invaluable assistance, notably during the terrible winter at Valley Forge, where

she busied herself night and day providing comforts for the sick soldiers. Mrs. Washington was a beautiful and charming woman, very domestic in her tastes. At Mt. Vernon she lived much as the ladies of the aristocracy of the Old World were accustomed to live, and was called by courtesy Lady Washington. She was an excellent hostess and greatly enjoyed entertaining.

Washington, Pa., a manufacturing and coal-mining center and the county seat of Washington County, 25 miles southwest of Pittsburgh, on Chartiers Creek and on the Baltimore & Ohio and the Pennsylvania railroads. Glass products, including bottles and jars, table glassware, colored art glass, wire glass, etc., are the leading manufactures. Other products include pipes and tubing, tinplate, tool steel and steel sheets, castings, boilers, and other metal goods, clay and stone products, leather, lumber and lumber products, children's vehicles, ferro tungsten and molybdenum, and soft drinks. Washington is the seat of Washington and Jefferson College (non-sectarian, men), established in 1802, and of Washington Seminary (girls), established in 1836. The place was founded in 1781. It was incorporated as a borough in 1810 and as a city in 1924. Population, 23,300.

Washington Elm, in Cambridge, Mass., a famous elm that stood for more than 200 years near the northwest corner of the Common. Under it Washington is said to have taken command of the American Army on July 3, 1775. In 1923 the aged tree, which though carefully protected had fallen into decay, crashed to earth while workmen were cutting off limbs that had become a menace to public safety. Portions of the wood were distributed to important institutions throughout the world.

Washington Monument, an imposing marble obelisk in Washington, D. C. The first movement toward the erection of this monument was made in 1783, when the Continental Congress recommended erecting an equestrian statue of Washington. Following Washington's

death, in 1799, Congress decided to erect a monument under which his body might be placed; but this plan failed, as did an attempt in 1816, by Congressman James Buchanan, to revive interest in the project. About 25 years later, however, the "Washington Monument Society" was formed, and \$87,000, in sums of \$1, was collected. On July 4, 1848, the corner stone of the monument was laid and the structure progressed slowly until 1855, when the Senate's failure to concur in an appropriation and the Civil War caused work upon it to be suspended until about 1876. In that year, through the efforts of Senator Sherman, an appropriation of \$1,000,000, to be paid in annual installments of \$30,000, was made. As the old foundation was then declared insufficient, a new one was constructed, and nine years later the monument was completed. On Feb. 22, 1885, it was formally dedicated by Robert C. Winthrop. The monument cost \$1,187,710. It covers an area of 16,000 sq. ft. and is 550 ft. high, being famous as the tallest monument in the world, with the exception of the Eiffel Tower of Paris. The top is protected by a cap of aluminum, and may be reached by an elevator or by an interior iron stairway of nearly 900 steps.

Washington, Treaty of, a treaty concluded between the United States and Great Britain, May 8, 1871, providing for the settlement of several subjects of dispute between the two governments, chief of which were the Alabama Claims. Aside from the adjustment of the Alabama Claims (See ALABAMA CLAIMS) provision was made for adjusting the fisheries question by the appointment of a commission to meet in Halifax and pass upon the value of certain privileges granted each of the contracting parties. It also submitted the northwest boundary dispute to the arbitration of the Emperor of Germany. Certain rules regarding neutrality in war which were laid down by this commission to govern the Geneva Tribunal in deciding the Alabama Claims have since been regarded as true principles of international law.

Washington University, at St. Louis, Mo. (1853), a non-sectarian, coeducational institution, with assets valued at \$15,000,000 and one of the important universities of the Mississippi Valley. It comprises a college of liberal arts, schools of engineering, architecture, commerce and finance, botany, law, medicine, dentistry, fine arts, a graduate school, and a division of University extension. It occupies fourteen modern buildings on the main campus of 165 acres, a large separate plant for its school of medicine and two affiliated hospitals, and a building for the school of dentistry. In 1918-19 the libraries contained about 176,000 bound volumes, enrollment 1914.

Washington, University of, at Seattle (1861). Opened in 1862, with funds secured by the sale of two townships of land granted by Congress, the institution received financial support after 1878 from the territorial government. It has a beautiful site between two lakes. Among its buildings are seven that were erected for the Alaska-Yukon-Pacific Exposition. The university includes the colleges of liberal arts, science, business administration, education, fine arts, fisheries, journalism, engineering, forestry, mines, and pharmacy; a law school, a school of library economy and a graduate school. It has a fine library and a large stadium.

Wasp, a highly interesting insect of the order Hymenoptera. There are many species, most of which are familiar; the best known are those having long, spindle-shaped bodies of a shiny metallic luster. All have strong jaws and long, slender antennæ, and many have fierce stings. Naturalists generally classify the wasps in two groups, the true wasps and the digger wasps; the first includes the families of yellow jackets and hornets, the parasitic wasps and the carpenter wasps; the second includes the solitary wasps which do not have a community life. This order allows great latitude of arrangement, and scientists disagree concerning closer classification.

The true wasps build nests of clay or self-manufactured paper, or tunnel in the wood of hollow trees. There they build

cells of wax, which are suspended from the top and center of the nest and are constructed in layers, tier upon tier. The eggs are placed in these cells and are there left from one to three days to hatch into the larvæ, or maggots, as they are called. In this stage the wasps are carnivorous and must be supplied with insect food; curiously enough, each species has one particular kind of insect upon which it feeds and will take no other. They remain larvæ for one or two weeks and then become pupæ, and after two or



A. NEST. B. WASP.

three weeks more, develop into adult wasps. As with the bees and ants, the true wasps have castes. There are three classes, the males, females and workers. The latter are wingless and are the ones which build the nests, provide the food and care for the young. In such communities the males and workers die at the approach of winter, and only a few of the females live to another season. These that survive have found some deserted mouse's nest and stored it with honey and nectar as a winter supply. In the spring they reappear and start nests for the first eggs, from which only workers issue. These workers enlarge the nest for the reception of more eggs which produce workers, males and females. Wasp paper is made by crushing splinters of wood and mixing them with saliva until they become pulpy; the mass is then rolled until it is about the consistency of dough and capable of being molded into shape. Nests often have 10 or 12 layers of the paper, but sometimes only three.

The solitary wasps dig tunnels in the ground, which they fill with insects paralyzed, but not killed, by a savage sting in a nerve ganglion. In each tunnel so constructed a single egg is laid, and the issuing larva is provided with food to last until the inactive pupa stage is reached. The nests of the mason wasps are said to have been the pattern for the earliest Indian pottery, and another species of wasp is said to use pebbles as tools for boring. See HYMENOPTERA; HORNET.

Watau'ga Association, an organization formed in 1772 for the settlement of the territory now comprising the State of Tennessee. The association comprised the first organized government west of the Allegheny Mountains, but they assumed authority over none but their members; consequently outlaws flocked to the territory under their control. In 1776 they were given representation in the North Carolina Assembly.

Watch, a pocket timepiece. The watch is a modification of the clock. The power is furnished by the uncoiling of a steel spring, and the motion is regulated by a balance wheel, instead of a pendulum. The first watches are supposed to have been made in Nuremberg at about the end of the 15th century.

A watch consists of two general parts, the works and the case. The more expensive cases are made of gold or silver, but cheaper grades are made of bronze and nickel. The works, except the balance wheel, are included between two plates, which are perforated to hold the pinions upon which the wheels revolve. The lower plate, or pillow plate, is next to the dial; the upper plate in the best watches is of one piece, but in cheaper works it may be in more. A watch has four wheels forming a "train." The first is the barrel wheel, within which the mainspring is coiled and to which it is attached. The others are known respectively as the first wheel, the second wheel and the third wheel, which is attached to the pinion of the escapement wheel. The balance wheel is given a back-and-forth motion by the combined action of

the mainspring and the hairspring, the first furnishing the motive power and the second causing the recoil. The wheel that meshes into the pinion of the escapement wheel is the one to which the second hand is attached, and revolves once a minute. It has 60 teeth on its circumference. The pinion of this wheel meshes into the wheel that imparts motion to the minute hand and makes a revolution once an hour. The pinion of this wheel meshes into the wheel that gives motion to the hour hand and makes a revolution once in 12 hours. A lever attached to the hairspring provides for the regulation of the movement, so that the watch will keep perfect time.

MANUFACTURE. Formerly all watches were made by hand labor, and in Switzerland some watches are still made by hand, but nearly all watches are now made by machinery. The credit of inventing watchmaking machinery and putting it into successful operation is due to American workmen and manufacturers, Mr. Aaron L. Dennison and Mr. Edward Howard being the leaders in the movement. After four years of experimenting, these gentlemen and others built in 1854 a watch factory in Waltham, Mass. This has become the largest watch factory in the world, and the second largest is at Elgin, Ill. These factories contain machines for making every part of a watch. The pinions, for instance, are made from wire, fed automatically into the machine, which turns out the completed pinion. The wheels are cut by means of dies from sheets of brass, and the plates are finished and boxed by machinery. These machines are so accurate that they can be adjusted to less than the thousandth of an inch, and the parts are so perfect that they fit without any modifying. In all the more expensive works, the pinions are set in jewels, which prevent wear. The garnet, the ruby and the sapphire are used. The jewels are smoothed, pierced and fitted to the perforations in the plate, to which they are fastened by minute screws. The plates, dials and cases are usually made in separate factories and by separate firms.

They are purchased by the watch factories, where all the parts of the watch are assembled or put together by skillful makers.

The average watch contains about 150 parts and the production of all these parts requires over 3700 distinct operations, the making of the balance wheel, for instance, requiring 40 operations. In the factories, machines doing the same work are grouped together, and one operative can attend six machines. The operative is usually seated in a chair, which runs on rollers on an iron track, so that he can move more quickly from one machine to another. Factory-made watches are more accurate than those made by hand, and the United States is the leading country in the manufacture of watches. See **CLOCK**.

Water, *Wau' ter*, a universally known liquid, upon the presence of which all plant and animal life depends. It was once supposed to be one of the four elements of which the universe was made; the other three were air, fire and earth. In 1781 Cavendish discovered that water was made up of two gases, hydrogen and oxygen; but it was not until 24 years later that Gay-Lussac found that it was produced by the union of two volumes of hydrogen with one of oxygen.

Water is familiarly known in three forms: gas (steam, vapor), liquid and solid (ice or snow). Water, unlike most substances, expands upon further cooling, a phenomenon commonly observed in the breaking of an earthen dish in which water has frozen.

Water dissolves so many solids and gases that it is not found pure in natural conditions. Rain and snow, which are the purest natural waters, contain three per cent, by volume, of impurities. Lake, river and spring waters contain impurities in larger quantities, the nature of which depends upon the nature of the material with which the water has come in contact. The impurities tend to accumulate in sea water, which therefore carries a larger proportion than the other natural waters. Some spring waters

contain impurities of such nature and in such quantity as to impart notable taste, and in some instances, medicinal effect. These are called mineral waters, of which there are many varieties: for example, *carbonated waters*, containing carbon dioxide, sometimes so much as to cause to effervesce; *alkaline waters*, containing usually sodium carbonate; *bitter waters*, containing magnesium salts; *chalybeate waters*, containing iron salts; and *sulphur waters*, containing hydrogen sulphide.

If a sample of water shows turbidity when soap is added to it, it is said to be hard; if there is no turbidity, it is said to be soft. Hardness causes a considerable consumption of soap before the cleansing effect of the soap is seen. The hardness and the consequent turbidity are due to the presence in the water of certain salts, especially lime salts, which when mixed with solution of soap cause the formation of new substances which contain part of the salt and part of the soap and which are insoluble; hence the turbidity and the precipitation. Hardness can sometimes be corrected by boiling the water a short time, because this in certain conditions throws the disturbing salts out of solution and thus stops their interference with the soap. Another consequence of this fact is seen in the hard earthy deposits of boilers if hard water is used. Hardness may be more surely corrected by adding to the water in suitable quantity such a substance as washing soda, or lime, or others which also throw the disturbing salts out of solution before the soap is used.

Water Bug, Giant. See ELECTRIC-LIGHT BUG.

Waterbury, Conn., a manufacturing center of New Haven County, 22 miles northwest of New Haven and 32 miles southwest of Hartford, on both sides of the Naugatuck River, 21 miles above its junction with the Housatonic River, and on the New York, New Haven & Hartford Railroad. Waterbury is the fourth city in population in the state and is one of the most important manufacturing centers of New England. There is an abundance of water power from the

Naugatuck River and its tributaries, Mad River and Great Brook. The city is attractively situated in the heart of the Naugatuck valley.

Waterbury has a number of handsome parks, playgrounds, and supervised recreational centers. Among the noteworthy parks are Library Park, Fulton Park, Chase Park, Hamilton Park, and Hayden Park. Columbia and Chase Park boulevards are two of the most attractive streets.

Among the city's educational institutions are St. Margaret's School (girls, Episcopal), established in 1875; Academy of Notre Dame (girls, Roman Catholic); and McTernan's School, a college preparatory school for boys. Westover School for young women is situated at Middlebury, near by.

Waterbury occupies the leading position among United States cities in the manufacture of brass products. The largest brass factory in the world is located here. In sheet and rolled brass, general brassware, and castings, the city furnishes probably the largest part of the products of the country. The brass industry here dates from 1802, when the manufacture of brass buttons was begun. Sheet brass was first made in 1830. The old-fashioned tall wooden clocks known as "Grandfather's clocks" were made here in the latter part of the 18th century and clock-making is still an important industry. The manufacture of inexpensive watches was begun in 1879, and Waterbury is today known for its extensive output of the cheaper grade of watches. The city's button industry was begun about 1760 when horn buttons covered with silver were made. Later, about 1800, block tin and pewter buttons were manufactured. Besides these famous products Waterbury produces a great variety of other commodities, especially of metal. There are manufactories of pins, coat hooks, lamps, electrical supplies, electric fixtures, machinery of various kinds, tools, glass, elastic webbing, recording instruments, fire extinguishers, oilers and pumps, decorated metal, paper, and vanity

boxes, chemicals, wire, tubing, perfume, macaroni, and dozens of other products.

The town of Waterbury, first called by the Indian name "Mattatuck," was settled in 1677 and was part of Farmington Township. It was set off from Farmington and incorporated in 1686. The city was chartered in 1853, and in 1901 the city and town of Waterbury were united into a single municipality. Population, 100,000.

Water Glass, or **Soluble Glass**, a term given to certain alkaline silicates containing an excess of alkali and soluble in boiling water. These silicates resemble glass when solid and remain unaffected by ordinary atmospheric changes. They consist of silicate of sodium, or the silicate of potassium or a mixture of both, and are employed for a number of purposes, including painting on glass, fireproofing and waterproofing in the form of a varnish, and making certain soaps, artificial stones and cements.

Water Hyacinth, *Hi' a sinth*, a native herb of India and Brazil, belonging to the Pickerel Weed Family. It was brought to Florida as an ornamental river plant, but it has spread so rapidly as to block the rivers and impede navigation. The roots float or are loosely buried in the muddy bottoms of shallow streams. The leaves form a circle on the surface of the water and are kept afloat by bladders filled with air, at the base of the blade. The flowers, which grow in a loose spike sheathed by a thin membrane, have two three-divided lips. Their general color is magenta-pink, but the middle lobe of the upper lip is marked with blue and has a bright yellow spot in the center. The lower lip is more spreading and somewhat upward curved. On account of the damage these rapidly-multiplying plants do to bridges and docks and to navigation, the Federal Government is trying to find means of destroying them or preventing their increase.

Water Lily, a lake and pond lily of the Water Lily Family. The long, horizontal roots bear round, half-divided leaves which lie flat on the surface of the water. The pointed, dark green buds

open in the morning sun and disclose the pure white petals and golden centers. The flowers, which bloom all summer, close early in the afternoon. After the blossoms fall, the stem droops so that the fruit ripens under water. In the



WATER LILY

tuber-bearing water lily, large tubers are attached to the roots. This lily is found in the Great Lakes region. The blue water lily of Egypt is cultivated in aquariums and has leaves with cut margins, and blue, fragrant flowers. The water lily is closely allied to the lotus.

Waterloo, Iowa, a manufacturing and agricultural center and the county seat of Blackhawk County, 6 miles southeast of Cedar Falls, 90 miles west of Dubuque, and 272 miles west of Chicago, on the Cedar River and on the Illinois Central, the Chicago Great Western, and the Chicago, Rock Island & Pacific railroads. The Waterloo, Cedar Falls & Northern electric line connects the city with the Chicago, Milwaukee & St. Paul and the Chicago & North Western railways. It has a municipal airport. Waterloo is situated in a rich agricultural and stock-raising region and is an important shipping point. The Dairy Cattle Congress and its allied exhibits, the National Belgian Horse Show and the American Poultry Congress, are held here annually.

The Cedar River at this point is 700 to 900 feet wide and affords excellent water power for manufacturing. The city's products are diversified, but meat-

packing is the largest industry. It is noted for the manufacture of farm machinery; it produces one-fifth of the stationary gasoline engines (farm type) made in the United States and is the third city in the country in the production of cream separators. Manure spreaders, tractors, and other farm implements are also produced in quantity. Concrete mixers, well-drilling equipment, washing-machine wringers, sheet metal fixtures, auto accessories, fabric auto supplies, garments, saddlery, refrigerators and cooling rooms, egg cases, and canned vegetables are among other products of the larger plants. The city also has extensive railroad shops.

Waterloo is attractively situated on both sides of the river, which is spanned by five concrete bridges within the city limits, and has beautiful drives and a public park system of more than 400 acres, with amusement grounds for children, a municipal bathing beach, athletic fields, etc. It is a league baseball town with a fine baseball park. The site of the city was first settled in 1845 and was called *Prairie Rapids*. It was platted as a town in 1853 and incorporated in 1868. It is governed by a mayor, four councilmen, and two councilmen-at-large. Population 36,900.

Waterloo, Battle of, the defeat of Napoleon. The battle was fought June 18, 1815, in a town of Belgium, about 12¹/₂ m. south of Brussels. The British were commanded by the Duke of Wellington and aided by the Prussians under Blücher. The fighting began at a little before noon, and the French were on the point of winning when Blücher arrived. The French were caught between the two armies, and in spite of the desperate charges of Napoleon's reserve, the Old Guard, the French were obliged to retreat. The French loss is estimated at about 42,000 men, and about 23,000 of the allies fell. Consult J. C. Ropes, *The Campaign of Waterloo*.

Wat'ermel'on, a prostrate or creeping vine of the Gourd Family, whose large, sweet fruits, also called water-

melon, are a delicious summer dessert. Everyone is familiar with its smooth, mottled-green rind and luscious red pulp. The plant is a native of Africa, but is raised in temperate zones everywhere. In the United States, Missouri, Georgia, Florida and a number of other Southern States raise large quantities of melons, but small "melon patches" are found in all the states and as far north as Ontario.

Water Meter, a mechanical device employed for measuring and automatically indicating the quantity of water passing through pipes. Water meters differ in form, but those most commonly used consist of a spherical chamber connected to the water supply and delivery pipes by flanges with bolts. The water flowing from the supply to the delivery side causes a disk to vibrate on a shaft, which, being geared into a system of wheels with dials, indicates the quantity of water in cubic feet that has passed through. In most cities meters are employed, so that consumers may be compelled to pay for the water they waste, as well as for what they use. See **WATERWORKS**.

Water Ouzel. See **OUZEL**.

Water Po'lo, a game for swimmers. Originated in England where the first county matches, and the first international contest, were held in 1890, it has now become popular in America, as well as throughout the British Empire and on the Continent. The ball must be round, waterproof, and from 26½ to 28 inches in circumference when inflated. Like basket ball, it is played without bat or racket, and most plays are made with one hand. The field of play must be from 19 to 30 yards in length, but not more than 20 in width. Goals are ten feet in width, with a crossbar three or eight feet above the surface. This bar is low when the water is five feet, or more, in depth. Teams consist of seven players each, and games last 14 minutes, seven minutes each way. After each goal, a three-minute rest is allowed. Water polo has already done much to stimulate interest in swimming, especially at natatoriums.

Waterproofing, the art of rendering cloth, paper and other substances impervious to water. Fabrics are rendered waterproof by applying to them a solution of rubber, or by a mixture of beeswax and yellow rosin in boiled oil, or by impregnating them with a solution of soap and then dipping them in a solution of alum. Paraffin is extensively used for waterproofing such substances as paper and leather. Wood soaked in hot, melted paraffin is made waterproof. Several varnishes, especially those containing water, are employed to render many articles waterproof. Paper can be made waterproof and to resemble parchment by immersing it in a solution of shellac and borax. See RUBBER; VARNISH; WATER GLASS; LINOLEUM.

Water Snake, a name applied locally to any semiaquatic serpent but technically given only to those of the Boa Family. The true water snakes are found in all countries where there are marshy streams abounding in the frogs, toads and small fish which form their prey. They are of two main classes, those which have longitudinal stripes and those which are banded. All have sharp teeth and ugly disposition but they are not poisonous. The young are born alive. The principal species are the diamond-backed, the green-banded and the western. When found in coastal streams the water snake is often called sea snake.

Waterspout, a whirlwind or tornado at sea. The spout appears as a very dark trunk or funnel of more or less tapering form, extending downward from a mass of heavy, black clouds. Like other cyclonic disturbances, waterspouts are due to the excessive heating of surface air, which when set in motion rises spirally with a rapid gyratory motion at its center. The air pressure of this central region is so reduced as to lower the temperature to dew point, so that the moist air on entering the whirl is rapidly condensed before reaching the upper strata of air, and the funnel cloud is formed. If the base of the funnel extends to the surface, the water is thrown

into violent commotion, and some of the spray of the waves may be drawn upward by the air current. But the dark column of the spout is not a mass of sea water as has popularly been supposed, but the heavy cloud formed by the rapid condensation of water vapor in the air and rotating at high speed.

Water Strider, a family of playful insects found skating upon the surface of brooks and streams from earliest spring until late autumn. The family is of the order Hemiptera, and its members, like all of this order, have an incomplete metamorphosis. The water striders, or water spiders, as they are sometimes called, have long, narrow bodies and six legs which rest so lightly upon the water as to make scarcely a ripple on its surface. The middle pair of legs are the rapidly-moving oars which act exactly like the oars of a boat; the posterior pair are the rudders which guide the insect in its darting circles about the stream; the short forepair rest on the water, but are ready to seize the unwary flies that dart too low. What seems to the onlooker like a merry game is perhaps as truly a struggle for existence as the larger ones carried on in the forest jungles. Water striders hibernate during the winter, but emerge on the earliest warm days to fasten their eggs to the grasses near the banks, and back to these banks they repair at night or during stormy days. Water striders are friends to man and act as scavengers in the tiny backwaters along the bank.

Watertown, Mass., a residential and manufacturing town adjoining Boston on the west, on the Charles River and on the Boston & Maine Railroad. It includes several villages. The chief manufactures are rubber goods, waterproof fabrics, stoves and ranges, soda fountains, clothing, knitted goods, gutta percha products, handling equipment, electric specialties, canned meats, biscuits, cement blocks, pianos, and paint and varnish. Watertown has a United States arsenal, which produces a large amount of modern ordnance and where concrete is developed

for commercial uses. It is the seat of the Perkins Institute for the blind. Watertown was settled and incorporated in 1630 and when, two years later, it was called upon to contribute toward the Cambridge fort, it made the first protest in America against taxation without representation. The Provincial Congress of Massachusetts met here in 1775-76. Population, 26,400.

Watertown, N. Y., a manufacturing and distributing center and the county seat of Jefferson County 70 miles north of Syracuse, on the Black River, 11 miles from Lake Ontario, and on the New York Central Railroad. It has a municipal airport. Watertown is situated on both sides of the river, which drops 112 feet in a series of falls here, and there are 18 water-power developments within the city limits. It is the center of a network of improved highways, connecting the Thousand Island region, the Adirondack Mountain resorts, and Syracuse and Utica. Watertown has a number of parks and playgrounds. Thompson Park, 196 acres in extent, has swimming pools, a zoo, and a golf course. The charitable institutions include two orphanages, one of which is of the group-cottage type, a county tuberculosis hospital and a hospital for contagious diseases.

Watertown is the industrial and commercial center of a large, prosperous agricultural area and has an extensive wholesale trade in various kinds of merchandise. It has the largest cheese board in the country, which holds meetings weekly. The city's outstanding manufactures are paper and wool-pulp products, machinery, tools, and appliances, textiles (silk) and clothing, and food products, including flour and breakfast food. In the vicinity are extensive deposits of iron and limestone.

The site of Watertown was purchased from the Indians by the state in 1778. The first settlers, who were attracted by the falls in the river, arrived in 1800. Watertown became the county seat in 1805 and in 1808 the first paper mill, which is still in operation, was started.

It was incorporated as a city in 1869. F. W. Woolworth, founder of the five-and-ten-cent chain stores, initiated the idea here in 1879. The city is governed by five councilmen, one of whom is mayor. Population, 33,700.

Watertown, S. D., an agricultural trade center and the county seat of Codington County, 100 miles north of Sioux Falls, on the Big Sioux River and on the Chicago, Rock Island & Pacific, the Chicago & North Western, the Minneapolis & St. Louis, and the Great Northern railroads. The Meridian and "Short Cut" national highways intersect here and the city has a municipal airport. Situated in a rich farming district, where corn, alfalfa, sweet clover, potatoes, and flax are the leading crops, and dairying, stock-raising, and poultry-raising are important industries, Watertown is a distributing and jobbing center for a large area. Among its industries are meat-packing, poultry- and egg-packing, and the manufacture of butter, mill work, concrete products, and flax tow. There are also sand and gravel quarries and railroad shops. Watertown is surrounded by picturesque scenery; Lake Kampeska, three miles distant, is one of the most beautiful lakes in the state. It was founded in 1881 and was incorporated in 1885. Population, 10,000.

Watertown, Wis., an agricultural and dairying center of Jefferson County 35 miles northeast of Madison on the Rock River and on the Chicago & North Western and the Chicago, Milwaukee & St. Paul railroads. It lies on both sides of the river, from which it derives water power for manufacturing. Among the manufactures are flour, bee-culture supplies, cigars, boxes, shoes, table slides, and foundry and machine-shop products. Watertown is the seat of Northwestern College (men, Lutheran), opened in 1865, and of Sacred Heart College (boys, Roman Catholic), established in 1872. It also has a Lutheran home for the feeble-minded. *Der Viehmarkt* (the cattle fair) was instituted in 1859 and has been held ever since on the second Tuesday of

each month. It brings the farmers of the vicinity to town to trade stock and make purchases. Settled in 1836, the place was incorporated as a village in 1849 and as a city in 1858. Population, 10,000.

Water Turbine, Tur' bin, or Turbine Wheel, a wheel designed to utilize the force of falling water for furnishing motive power but differing from the ordinary water wheel. While the water wheel revolves like a roller, the water turbine whirls on its vertical axis in a close-fitting case. Water is admitted to the wheel through a vertical or oblique pipe or chute, called the penstock, and enters first through openings in the case between curved guides so inclined as to force the water to strike corresponding buckets around the periphery of the wheel, driving the wheel partly by the momentum of the impact and partly by the weight of the water against the buckets. The wheel is always placed at the lowest possible point in order to get the greatest pressure of the water. A governor similar to that used on steam engines is employed to change the incline of the guides in the wheel case and thus govern the speed. The largest water turbines in the world are used at Niagara Falls for converting water power into electromotive force by the aid of electric generators. See WATER WHEEL; ELECTRICITY.

Waterville, Me., an industrial city of Kennebec County, 19 miles northeast of Augusta, on the Kennebec River and on the Maine Central Railroad. Hydroelectric developments on the river furnish power for manufacturing. The largest industrial establishments are car shops, cotton mills, worsted mills, and manufactories of fiber dishes, iron products, shirts, trucks and tractors, boats and canoes, bricks, stoves, and foundry products. At Winslow, across the river, are large pulp and paper mills. Waterville is the seat of Colby College (coeducational, Baptist), established in 1820, and of Coburn Classical Institute. Settled about 1764 by emigrants from Cape Cod, the town was part of Winslow until 1802, when it was incorporated. It was chart-

ered as a city in 1888. Population, 14,600.

Watervliet, N. Y., a manufacturing center of Albany County on the Hudson River opposite Troy, with which it has ferry and bridge connection, on the Delaware & Hudson Railroad four miles north of Albany, and on the New York State Barge Canal. It is at the head of navigation on the Hudson and, by means of the canal, is connected with lakes Erie and Ontario. Watervliet has iron- and steel-working plants, clothing factories, a bell foundry, and a silk-throwing plant. The United States government established here in 1813 the Watervliet Arsenal, one of the largest plants for the construction of guns and other war material in the country. It is on a reservation of more than 100 acres, with a wharfage on the Hudson. The city has two homes for children. Watervliet was founded in 1825 as the village of West Troy. In 1896 it was chartered as a city under its present name. It has the commission form of government. Population, 16,200.

Water Wheel, a wheel constructed and arranged for operating machinery by water power. The power is derived from the weight of the water and force of the current. There were two general patterns of the old-style water wheel, the overshot and the undershot. The overshot wheel had a series of buckets around its periphery, and received the water at the top. The buckets were so constructed that when they reached the lowest point in the rotation of the wheel they emptied, and the power was derived from the weight of water in the descending buckets and the force of the current at the point where the water came in contact with the wheel. The undershot wheel had floats on its periphery similar to those on the paddle wheel of a steamboat and received the water at a point a little above the lowest point in the circumference. The power was derived wholly from the impact of the current. This type of wheel was useless, except where great pressure could be secured.

The Pelton water wheel is constructed with a series of buckets on its periphery, which operate by the impact of a jet of water, generally under high pressure. It is used extensively in California and in the mountainous regions of the Pacific States for converting water power into electrical power. Under the high pressures of water obtained in these places it is highly efficient and is preferred to the water turbine for this class of work. See WATER TURBINE.

Wat'erworks", a term commonly applied to a steam-power pumping plant with a system of pipes and conduits connected with reservoirs for supplying water to communities. The sources of supply are usually streams, lakes, springs and wells. When the water is brought from streams or lakes, care must be taken to get a drainage area which has not been contaminated by the refuse of the surrounding population. New York City derives its water supply from the watershed of the Croton River which flows into reservoirs through an aqueduct nearly 30 m. long (See AQUEDUCT). Chicago and Cleveland get their water supply by pumping from the adjoining lakes through tunnels, which are bored out under the lake bottoms for several miles, that a supply uncontaminated by shore refuse may be obtained. When the water is taken from wells, the wells should be driven or sunk several hundred feet, so that the supply may be constant and free from impurities that might occur by seepage from the surface.

There are two systems of distribution, the reservoir and pumping systems. In the former, the water is derived by natural flow or by pumping into reservoirs and distributed by gravity. In the latter the water is pumped into water mains by pumps working day and night; this system is cheaper to install, but more expensive to operate. In towns without hills for the elevation of a reservoir, a stand pipe of large dimensions and with sufficient capacity for several hours' supply is sometimes erected. The water is constantly pumped into this in

order that a pressure may be maintained. The amount of water used daily in American cities is about 100 gallons per person. See WATER METER; RESERVOIR.

Wat'son, Henry Brereton Marriott (1863-), an English novelist, born at Caulfield, Australia. He was educated in New Zealand and in 1885 removed to England, where he became a journalist, being assistant editor of the *Pall Mall Gazette* and of *Black and White*. His works include *The Web of the Spider*, *The Heart of Miranda*, and *Other Stories*, *The Princess Xenia*, *Chloris of the Island* and *The Adventurers*.

Watson, John (1850-1907), a Scottish clergyman and author, better known as Ian Maclaren, born in Manningtree, Essex. His parents were Scotch, and he received his education principally at Edinburgh University. He became minister in the Free Church of Scotland in 1874, and after serving in Perthshire and at Glasgow he took charge of the Sefton Park Presbyterian Church, in Liverpool, in 1880, retiring in 1905. He was the Lyman Beecher lecturer at Yale in 1896, and during a lecturing tour through the United States in 1907, died at Mt. Pleasant, Iowa. His writings, many of them studies of rural Scottish life, were popular to an extraordinary degree. The novels include *Beside the Bonnie Brier Bush*, *The Days of Auld Lang Syne*, *Kate Carnegie*, *A Doctor of the Old School*, *Afterwards* and *Rabbi Saunderson*. His lectures at Yale appeared under the title of *The Cure of Souls*. Other volumes are *The Upper Room*, *The Mind of the Master*, *Companions of the Sorrowful Way*, *Doctrines of Grace* and *The Potter's Wheel*.

Watson, Thomas Edward (1856-1922), an American lawyer and writer, born in Georgia. After a course in Mercer College, he prepared himself to study law, and settled in Thomson, Ga. In 1882 he was sent to the State Legislature; in 1891 became a member of Congress, securing while here the first appropriation for free delivery of mails in

rural districts that Congress ever passed. In 1895 he resumed the practice of law. In 1896 he was the unsuccessful candidate for vice-president of the United States on the Populist ticket; and in 1904 was candidate for president on the same ticket. He published *Watson's Jeffersonian Magazine* and *The Weekly Jeffersonian* and is the author of several books, among them, *Life of Napoleon*, *Life of Thomas Jefferson* and *The Story of France*.

Watt, a unit in common use for measuring electrical power. It is equivalent to a current of one ampere per second and having a pressure of one volt. Since these are small units for practical purposes, the kilowatt (1000 watts) and the hour are used in large measurements, the result being expressed in kilowatt hours.

Watt, James (1736-1819), a mechanic and engineer, famous as the improver of the steam engine, born at Greenock, Scotland. He was weakly as a child and unable to attend school with regularity, but was an ardent student. Having decided to become a mathematical-instrument maker, at the age of 18 he went to London to learn the trade, but ill health compelled him to return home within a year. Three years later he established himself in his chosen trade at Glasgow, where he was appointed maker of mathematical instruments for the university. However, he was unable to support himself at his trade, and for a time engaged in civil engineering, in this capacity making surveys for canals and harbors. Living in the college at Glasgow, Watt devoted his spare time to the study of science, and became interested in experiments on the force of steam. While repairing for the college a working model of the crude steam engine then in use, he became impressed with its defects. These he remedied. However, he was not satisfied with mere improvements, but decided to make an engine of his own, which should have nothing but steam for its motive power. This was successfully accomplished, and Watt was granted a patent for his new

engine in 1769. These engines were subsequently manufactured in Soho, near Birmingham, by the firm of Boulton and Watt, which firm immensely improved the quality of workmanship used in building machinery, and extended the application of the new power to innumerable uses. Watt realized a fortune from his inventions, and was the recipient of merited honors. See STEAM ENGINE.

Watteau, Va' to', Antoine (1684-1721), one of the most celebrated French painters of the 18th century. He was of humble Flemish origin, but his art was more French than Flemish. At the age of 18 he went to Paris, where necessity forced him into commercial art, though, fortunately, in association with men of talent and training. Along with this ornamental design and decoration, he labored independently at more serious and ambitious works and developed a style in which formal gardens and woodland backgrounds serve as a setting for the fashionable ladies and gallants in rich and elaborate costumes who disport themselves with all the airs and graces of the time. This style was the foundation of a school, of which Watteau himself was the leading exponent. The finest collection of the works of Watteau was owned by the Emperor of Germany.

Wat'erson, Henry (1840-1921), an American journalist and orator, born at Washington, D. C. His first start as a journalist was made at Washington in 1858. Later he went to Nashville, Tenn., where he edited the *Republican Banner*. In 1868 he went to Louisville, Ky., where he became noted as the editor of the *Louisville Courier-Journal* and as a prominent advocate of free trade. In 1876-77 he filled a vacancy in Congress. This is the only time he ever consented to accept a public office, although four times he has been a delegate from Kentucky to the National Democratic Conventions. He has made many public addresses, among them the dedicatory oration at the opening of the Columbian Exposition in Chicago in

1893. He is also widely known for his celebrated lecture on Abraham Lincoln. He has not only contributed to many periodicals, but has also published several books.

Watts, George Frederick (1817-1904), an English painter and sculptor. He studied at the Royal Academy schools and attained early fame as a portraitist. His portraits are forceful and lifelike, and include likenesses of the leading men and women of his time. But his chief works are the allegorical and symbolical pictures, in which he sought to convey a message to mankind of the power of love, the danger of the lure of wealth and the vice of cruelty and greed. Important among his works are *Love and Life*, *Love and Death*, *Faith*, *Sir Galahad* and *Ariadne in Naxos*.

Watts, Isaac (1674-1748), an English minister and hymn writer, born at Southampton. While a tutor at Stoke-Newington, he assisted the Rev. Dr. Chauncey, pastor of the Independent Church in Mark Lane, himself becoming pastor in 1702. In 1712 his health failed, and for the rest of his life he resided with Sir Thomas Abney, at Theobalds. His theological works are numerous, but he is best remembered as a hymn writer, having written several hundred sacred songs. Among the finest of these are those beginning "O God, our help in ages past" and "When I survey the Wondrous Cross."

Waukegan, Ill., a manufacturing city and the county seat of Lake County, 40 miles north of Chicago and 50 miles south of Milwaukee, on Lake Michigan and on the Chicago & North Western, the Chicago, North Shore & Milwaukee, and the Elgin, Joliet & Eastern railroads. It is beautifully situated on a high bluff overlooking the lake and has a good harbor and a fine beach. The leading manufactured products are asbestos roofing, wire products, canning machinery, outboard motors, shoe uppers, gray iron, brass, and aluminum products, chemicals, electric specialties and radios, and envelopes. A huge electric generating plant, situated here, furnishes power for a large area. Waukegan

is a Pottawattomie word meaning "little fort," a name given the place by the Indians because a fort once stood here. The village was incorporated in 1849 and the city in 1859. Population, 22,300.

Waukesha, Waw' ke shaw, Wis., a dairying, manufacturing, and health center and the county seat of Waukesha County, 18 miles west of Milwaukee, on the Fox River and on the Chicago & North Western, the Chicago, Milwaukee & St. Paul, and the Soo railroads. Waukesha is the center of a famous dairying section, noted for its Holstein, Guernsey, and brown Swiss cattle. There are extensive manufactures of gasoline motors, and large quantities of mineral waters are shipped from the medicinal springs for which the city is widely known. Other products include castings, church furniture, milking machinery, malted milk, bottling machinery, raincoats, steel window sash, plows, brick, and foundry products. It has several sanitariums and resort hotels. Carroll College (coeducational, Presbyterian), established in 1846, is the leading educational institution and Waukesha also has a state industrial school for boys. The place was settled in 1839, incorporated as a village in 1852, and chartered as a city in 1896. Population, 15,100.

Wau'sau, Wis., a manufacturing and distributing center and the county seat of Marathon County, 200 miles northwest of Milwaukee, on the Wisconsin River and on the Chicago & North Western and the Chicago, Milwaukee & St. Paul railroads. Alexander Field, on the banks of the river, is a municipal airport with facilities for landing both land- and seaplanes. Wausau is situated in the midst of some of Wisconsin's most beautiful scenery. The river has falls here, and there is a \$1,000,000 power dam in the heart of the city which furnishes electric power for manufacturing. The principal manufactured products are milk products, lumber, sash and doors, shoes, sandpaper, box shooks and building supplies, dry and radio batteries, rubber goods, foundry and machine-shop prod-

ucts, boxes, electric motors, saw- and paper-mill machinery, flour, concrete products, and structural iron. Farming, dairying, lumbering, granite-quarrying, and silver-black fox-farming are industries of the vicinity. Wausau is the seat of a county teachers' training school and of a county home and hospital. The city was built on the site of a logging camp established in 1838, and was for many years exclusively a lumber town. It was incorporated in 1858 and chartered as a city in 1872. Population, 20,300.

Wave, a process in which a particular state or condition is continually handed on without change, or with only a gradual change, from one part of a medium to another. Energy is thus transmitted great distances; sound waves, light waves, electrical waves, water waves are all examples. Water waves which travel over the surface of the water in consequence of some local disturbance are familiar examples, but they are far from being the simplest instances of wave motion. It will be noticed in watching water waves that it is the wave and not the water which travels forward. If a chip be floated on the water, it will be seen that the chip merely rises and falls and moves slightly forward and backward as the water waves pass. In other words, the chip and the parts of the water very near to it execute vibrations in a more or less elliptical path about their mean positions where at rest. This feature is characteristic of all wave motion in ordinary media; the form of the vibrations of the individual parts or minute particles of the medium varies with the medium and with the nature of the wave being transmitted.

Waves are generally classed as transverse or longitudinal, according as the small motions of the individual particles of the medium are to and fro at right angles to the direction the wave is advancing, or are to and fro in the same direction the wave is advancing. Solids are capable of transmitting waves of both kinds, while liquids and gases can

transmit only longitudinal waves. Water waves and other waves on the surface of a medium are not purely of either kind, but are complex, being largely transverse in character.

Perhaps the simplest wave motion is found in sound waves. Here the wave is longitudinal in character and the individual particles of the air (or other medium) move to and fro in the direction the sound is advancing, this to-and-fro motion occurring as a series of compressions and rarefactions of the air as the sound passes any point. See SOUND.

When we consider ether waves, we are not dealing with an ordinary medium. From experiments in the polarization of light, it is evident that the condition or state that is being transmitted is transverse to the direction of propagation of the light wave. Experiments show that light waves, radiant heat waves and the still longer electromagnetic waves used in wireless telegraphy are all ether waves of the same general nature, differing only in wave-length and frequency. From a study of electromagnetic waves, it is shown that the wave consists of alternate magnetic and electric stresses, or states, of the medium, being set up at right angles to each other, and at right angles to the direction of propagation of the wave at any part of the medium through which the wave is passing. From a study of these waves is built up the electromagnetic theory of light, the one now generally accepted. See LIGHT; TELEGRAPH, WIRELESS.

Wax, a solid fatty substance allied to the fixed oils and fats and derived from animal and vegetable sources. Wax is harder and more solid than fat, does not melt so easily and burns with a bright flame. Beeswax and spermaceti are animal waxes, but palm wax, myrtle wax and Japanese wax are of vegetable origin. Beeswax is made by bees to form the cells in which they store their honey (See HONEY), and in its natural state, when pure, is light yellow in color. Beeswax is procured from honeycomb. After the honey is extracted the comb is placed in boiling wa-

ter; the wax is melted and rises to the surface of the water. It can then be skimmed off in liquid form, or the water can be allowed to cool. This solidifies the wax and it can then be removed in cakes. It is finally bleached and pressed into molds. Japanese wax is obtained from the fruit of a tree by boiling; palm wax, from various species of South American palms. Myrtle wax or candleberry wax is made from the berries of the wax myrtle or bayberry. The mineral waxes are those substances found oozing in small quantities from rocks in various coal regions. Paraffin instead of beeswax is much used now for making candles. Stearin and spermaceti are also used for this purpose. See BEE; SEALING WAX; CANDLE; STEARIN; SPERMACETI; PARAFFIN.

Wax Myrtle, or **Candleberry**, a spring-flowering shrub of the Sweet Gale Family, growing in coast regions of the United States. It grows only from two to eight feet high but bears many long, fragrant leaves which have shiny surfaces and uncut margins. The flowers upon one shrub are staminate, that is, they bear the stamens containing the fertilizing dust; and upon another pistillate, that is, containing the pistils with unripened fruit. Both kinds of flowers are in short catkins. The fruits are dry nuts generally embedded in a soft, white gum which gives them the appearance of waxy berries. The wax myrtle is sometimes called bayberry.

Wax Palm, *Palm*, a South American tree of the Palm Family, whose leaves and trunk produce a valuable wax. Other than for this deposit the tree has the usual characteristics of the ordinary palms, straight, unbranched trunks and feathery leaves. The leaves of this palm exude a white wax, which covers them, sometimes to a depth of nearly one-fourth of an inch. It is removed by heat or by dissolving in ether or hot alcohol; mixed with tallow, it is used for making fine, white candles.

Wax Tree. See WAX MYRTLE.

Wax-wing" Family. The Waxwings are confined to the Northern Hemi-

sphere. Three species are known: one is peculiar to North America; the second is confined to Japan and adjacent parts of Asia; and the third is widely distributed throughout the northern parts of Europe, Asia and America.



WAXWING

CEDAR WAXWING. This is the best-known member of this family, ranging from southern British America south to Central America and Cuba. This handsome bird (a little larger than the English sparrow) may be known by its grayish-brown body, which is yellow underneath, its black patch across forehead and eyes, its yellow-tipped tail and scarlet-tipped wings. They are fond of juniper berries and other wild fruits, but they also eat large numbers of insects. During the mating season, which is very late, the birds pair and bill and coo like doves. The nest is built from 5 to 30 ft. from the ground and is composed of grass, fine roots, moss and a little mud. If rags and twine are at hand, they are also included.

BOHEMIAN WAXWING. This bird winters in the northern part of the United

States and the southern part of British America north of the 60th parallel of north latitude. It is somewhat larger than the cedar waxwing and is similar in color, differing principally in having a black throat, chestnut patches on the forehead, and on the wings, white and yellow, as well as red, waxlike tips.

Waycross, Ga., an industrial city and the county seat of Ware County, 78 miles northwest of Jacksonville, Fla., on the Atlanta, Birmingham & Coast, the Atlantic Coast Line, the Waycross & Southern, and the Waycross & Western railroads. The city is the commercial center of a rich farming region, the chief products of which are tobacco, corn, sugar cane, melons, potatoes, and vegetables. It is an important tobacco market and also has livestock interests.

There are railroad shops, planing mills, a pecan-nut-cracking plant, and manufacturing of ice, furniture, burial caskets, mattresses, and cigars. The manufacture of lumber and of naval stores are important industries of Ware County. The leading educational institution is Piedmont Institute, a coeducational junior college. Waycross was settled in 1870, incorporated in 1874, and received a city charter in 1909. Population, 20,500.

Wayne, Wane, Anthony (1745-1796), an American soldier, born in Easttown, Pa. He was educated in Philadelphia and worked as a surveyor. When the Revolutionary War broke out he organized a battalion of troops which he led into Canada. For his service at Three Rivers he had command for some time at Ticonderoga, where in February, 1777, he was commissioned brigadier-general. Shortly after he commanded the "Pennsylvania Line" at Morristown, later distinguishing himself at Brandywine, Germantown and Monmouth. At Washington's suggestion he then organized a light infantry corps, with which he performed the most brilliant feat of the war, the bayonet charge on Stony Point, July 15-16, 1779. For this he won the sobriquet "Mad Anthony" Wayne. He aided Lafayette against Cornwallis in

1781, and after the surrender at Yorktown served some time in Georgia and South Carolina. He later filled a number of civil appointments in Pennsylvania, eventually removing to Georgia, where he had been given a large rice plantation by that state. He represented Georgia in Congress in 1791 and 1792, and in the latter year became general-in-chief of the United States army and led an expedition against the Indians of the Northwest. His victory over them at Fallen Timbers, Aug. 20, 1794, with the Treaty of Greenville, August, 1795, opened the Northwest to colonization.

Wealth, Welth. See CAPITAL.

Weasel, We' z'l, a family of flesh eating, fur-bearing animals found mostly in cold regions, where they form a large class of sharp-toothed, clever little animals whose chief use is destroying insect and Rodent pests. The family includes three classes: the martens, weasels and wolverines; the badgers and skunks; and lastly the otters.

The weasel, the animal which gives its name to the family, is an active and alert hunter, with narrow, pointed head, rounding skull and black, beadlike eyes. The neck and body are long and flexible and give the weasel a snakelike appearance. The tail is long, furry and always tipped with black. In summer the weasel has a reddish-brown coat, which, in Northern regions, it changes in winter to one that is pure white except for the black tip of the tail. This white winter coat of the weasel is called ermine and has received distinction through its use upon royal robes and garments of State. The black spots in an ermine robe show where the tail of the weasel has become a part of the fur. Further south the weasel's coat also turns pale in the winter, but is pure white only in the snowy regions. In European countries the weasel is frequently spoken of as the ermine or the stoat; in America the name ermine applies only to the fur.

Weather Bureau, Bu' ro, a bureau in the department of agriculture having for its purpose forecasting the weather making systematic meteorological obser-

vations and giving notice of the approach of storms and floods. The bureau is divided into several divisions, the most important being:

(1) **THE FORECAST DIVISION.** This division receives twice each day reports from all stations in the United States, the West Indies and the Canadian provinces. From the information embodied in these reports it makes the weather maps. These charts include the forecast for the entire country and the Atlantic Ocean as far as the Grand Banks. The maps show the areas of high and low barometric pressure, the areas of equal temperature, the direction of the wind and the condition of the sky, as clear, cloudy or rain or snow. They are widely distributed throughout the country.

(2) **THE DIVISION OF RIVER AND FLOOD SERVICE.** This division gathers



WEATHER FLAGS

information concerning rainfall (including snow) in the great river basins and gives information for protecting river valleys from flood and for aiding commerce.

(3) **DIVISION OF CLIMATE AND CROPS.** Most of the observers in this division are voluntary. They are widely distributed throughout the country and are 3000 in number. They report on rainfall, temperature and other conditions which affect the growth and ripening of crops. This information is summarized in crop bulletins issued weekly and monthly. They are regarded as good authority on the crop conditions of the country.

(4) **OTHER DIVISIONS.** There is a division which has charge of testing all instruments used, another that has charge of publications, another of telegraphy and so on, the entire bureau being thoroughly organized for its work.

The *Monthly Weather Review* is the official organ.

STATIONS AND SIGNALS. There are over 200 weather-bureau stations in the United States. Each station is in charge of trained observers and is equipped with a full set of instruments. The observations are taken at 8 a. m. and 8 p. m., Washington time, and the results telegraphed to the central station of the district in which the station is located and to the central office at Washington. At these central stations maps are made and reports prepared and issued to the country.

The flags are of two classes, weather flags and storm flags, the latter being used to warn shippers and navigators of approaching storm. The weather flags are (1) a large white flag, indicating fair

weather; (2) a flag half white and half blue, indicating local rain or snow; (3) a large blue flag, indicating general rain or snow; (4) a blue triangular flag, indicating temperature; placed above another flag it indicates a rise in temperature; placed below, it indicates a fall in temperature; (5) a large white flag with a black square in the center.

This is the cold-wave flag and indicates a sudden and marked drop in temperature.

There are three storm flags: the warning flag, a square red flag, with a black square in the center; the white triangular flag; and the red triangular flag. Both of these latter are

wind signals. When the warning signal is displayed with the white flag above it (Figure 1), it indicates a storm with wind from the northwest. If the white

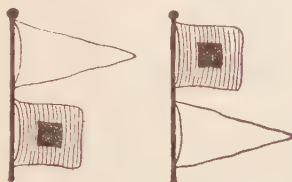


FIGURE 1 FIGURE 2

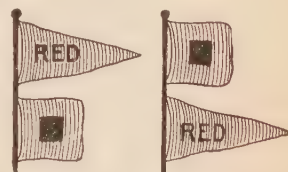


FIGURE 3 FIGURE 4



FIGURE 5

flag is below (Figure 2), it indicates wind from the southwest. The red flag above the warning signal (Figure 3) indicates wind from the northeast; below, it indicates wind from the southeast (Figure 4). Two warning flags displayed one above (Figure 5) the other indicate the approach of a violent storm.

The forecasts relating to temperature and winds are usually correct; those



NEST OF WEAVER BIRD

referring to local changes are more difficult and consequently more liable to fail.

HISTORY. Before the Civil War there were attempts to maintain a systematic weather service, but they were of little value. In 1870 the weather bureau was organized as a division of the signal service in the regular army. Gen. Albert J. Meyer was the first chief-signal officer, and to him and his successors, General

Hazen and General Greeley, the thoroughness and efficiency of the organization are largely due. In 1891 the bureau was transferred to the department of agriculture. Great Britain, Canada, France, Germany and practically all civilized countries now maintain weather bureaus. See CLIMATE; METEOROLOGY.

Weaver, Weev' er, Bird, a name given to certain finchlike birds which build or weave remarkable nests for the protection of their eggs and young. These nests are of many shapes and sizes, and the texture ranges from a delicate fabric, so loosely woven that the contents may be seen through the sides, to a nest so solid that it will bear a good deal of rough usage. About 250 species are known, which live in Africa, Asia and Australia. One of the most interesting is the social weaver bird, which is found in the interior of Africa. This bird is about five inches long, and is of a brownish color. A number of birds build a common habitation. The roof is composed of grass piled on a branch so as to form a very large, umbrella-shaped structure. It is solid on top, but beneath are many small cavities which are lined with feathers, in each of which three or four drab-colored eggs spotted with purplish-gray are laid.

Weaving, the art of making cloth by interlacing yarns or threads, one set of which is at right angles to the other set. One set of threads, called the warp, extends lengthwise of the web from end to end; the other set, called the weft or filling, extends across these at right angles and interlaces with them. Weaving consists of three operations: setting the warp threads for the web; working the weft threads into the warp to and fro by means of a shuttle; and "beating up" the weft threads, or driving them firmly into the warp by means of the batten. However intricate the pattern produced, it depends fundamentally upon these three operations, all of which are performed on a loom.

Loom. The modern loom is a development of the hand loom, which had been in use for several centuries before

the power loom was invented. The hand loom consisted of a square, wooden frame supported on four posts, to which the working parts of the loom are attached. The center beam at the back is the warp beam. Beneath this is the wooden cylinder, on which the warp is wound. The beam extending across the front a little below the center is the breast beam, which supports the weaver. Beneath this is the cylinder, upon which the web is wound as it is woven. The top of the frame supports the batten, which is attached to a movable horizontal bar by two vertical pieces, one at each end. Another bar across the top of the frame supports a set of pulleys and the heddles. These consist of two frames, from which cords are attached by loop or eye to each thread in the warp. Usually each alternate thread is attached to one heddle, and the other threads to the other. The heddles are connected by cords, which pass over the pulley in the top of the frame, with treadles operated by the weaver. The batten contains a reed, through which the threads of the warp pass.

The weaver presses on the treadle and raises the alternate threads of warp, while depressing the others, thus forming an angle, or "shed," for the thread of the weft, which is placed in position by throwing the shuttle. The other treadle is then pressed and the thread of the warp "beaten up" by striking it with the batten. The web is completed by numberless repetitions of these operations.

The power loom was invented by Cartwright in 1784 (See CARTWRIGHT, EDMUND), and soon worked a revolution in the textile industry of England. Later, it was extended to other countries. Many additions and improvements have been made, so that we now have looms of many patterns, each designed for its special purpose. The Jacquard loom is a French invention with a complicated arrangement of heddles for weaving portraits, landscapes, flowers and other devices. The materials most extensively used in the manufacture of cloth are

cotton, wool, flax and silk. Coarser materials are employed in making bagging, carpeting and matting. See SPINNING.

Webb, Alexander Stewart (1835-1911), an American soldier, born in New York City and educated at West Point. He entered the artillery, fought the Seminoles and was professor of mathematics at West Point. In 1861 he became major of artillery, fought at the first Battle of Bull Run, in the Peninsula Campaign and the Maryland and Rappahannock campaigns, and in June, 1863, was commissioned brigadier-general. After Gettysburg he received a medal from Meade, for whom he became chief of staff. In 1865 he was brevetted major-general in the regular army. He published *The Peninsula: McClellan's Campaign of 1862*.

Weber, Va' ber, Karl Maria Friedrich Ernest von (1786-1826), one of the most eminent composers of the 19th century, born at Eutin, Germany. His father, a shiftless musician, was eager to make him a musical prodigy like Mozart and exhibit him for profit. The family wandered about during the first 12 years of the boy's life and he had a number of music instructors, including a brother of Joseph Haydn. At the age of 13 he began writing operas. He exercised a noble influence on the music of his time and that which followed. Through his opera, *Der Freischutz*, he became the founder of the romantic school of German opera. His influence on Wagner was very marked. *Oberon* and *Euryanthe* are others of his notable operas; his *Leyer und Schwert* are spirited German patriotic songs; and *Invitation à la valse* is one of his brilliant piano compositions.

Webster, Mass., a manufacturing town and resort of Worcester County, 16 miles south of Worcester and 50 miles southwest of Boston, on the French River and on the New York, New Haven & Hartford Railroad. Within the town is the largest lake in the State of Massachusetts, 17 miles in circumference. One of the first cotton mills in the United States, built here in 1812, still stands.

The leading manufactured products are cotton cloths and print goods, shoes, woolen cloth and woolen yarns, optical goods, and caskets. The town, which includes several villages, was incorporated in 1832. Population, 13,400.

Web'ster, Daniel (1782-1852), an American orator and statesman, born in Salisbury (now Franklin), N. H., the son of a farmer. He received his first education from his mother, later, during intervals of farm work, attended a village school, and when 15 went to Dartmouth College, where he graduated in 1801. Despite great sacrifices on the part of his father, Daniel was obliged to defray part of his college expenses by teaching school. He then studied law privately and with a Boston firm, was admitted to the bar in 1804 and soon rose to eminence in his profession at Portsmouth, N. H. In 1812 he was elected to Congress by the anti-war party, and, though he already had a wide reputation as an orator, his maiden speech on the Berlin and Milan decrees, which he delivered on June 10, 1813, completely awed the nation. Later speeches, recommending the increase of navy and the embargo repeal, added, if possible, to his reputation.

In 1816 Webster removed to Boston and for the next seven years devoted himself almost entirely to his practice. His services in the Dartmouth College Case, which was carried into the Supreme Court in 1817, ranked him with the foremost lawyers of the country, his fame resting especially upon his insight into constitutional law. Subsequently he delivered powerful speeches at the bicentenary of the landing of the Pilgrims, 1820, on the laying of the corner stone of Bunker Hill Monument, 1825, at the memorial services which were held for Adams and Jefferson, the following year, and at the completion of Bunker Hill Monument, 1843. Meanwhile, in 1820, Webster was a member of the Massachusetts Constitutional Convention, and in 1822, 1824 and 1826 was elected to Congress, where he made his famous speech on the Greek Revolution, and, as

chairman of the judiciary committee, was responsible for the revision of the criminal law of the United States. In the House, and later in the Senate, of which he was a member from 1827 to 1841, he led in supporting the administration.

Webster's celebrated speech in reply to Robert Y. Hayne of South Carolina, delivered in the Senate in January, 1830, and favoring the nationalist view of the Constitution, "is considered the most correct and complete exposition ever given of the true powers and functions of the National Government." This address was more widely circulated than any other American document of a similar nature. Later his support of Jackson's policy did much to prevent secession in South Carolina, which state favored the nullification ideas of Calhoun. In 1839 Webster visited Europe, where he was accorded great attention. Having previously failed in his candidacy for the presidency, he served as secretary of state from 1841 to 1843, when he retired from President Tyler's cabinet. During this time he negotiated at Washington the famous Webster-Ashburton Treaty (See WEBSTER-ASHBURTON TREATY). He supported Clay as a candidate for president in 1844, and as United States senator in 1845 strongly opposed the annexation of Texas and California and the Mexican War, but supported the compromise measure of 1850. His concessions to the demands of slaveholders, made in a speech which he delivered on March 7 of that year, lessened his influence with the free-labor states. Meanwhile, in 1848, he had again been unsuccessful in aspiring to the presidency, but from 1850 until his death he was secretary of state under President Fillmore, filling this post with great distinction. In January, 1852, he made his last notable appearance in court.

Throughout his public career Webster was actuated by a great love for the Union, which he believed had to be preserved at any cost. Of fine physique, he devoted much attention to agriculture

and was fond of hunting and fishing. George Ticknor Curtis has ably written his biography.

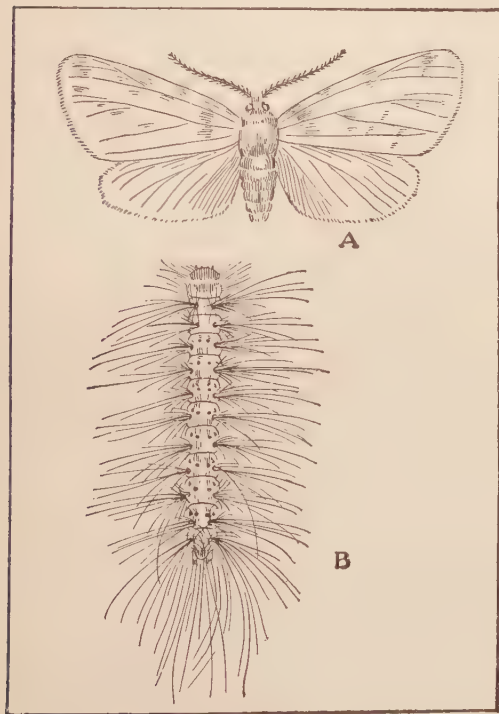
Webster, Noah (1758-1843), an American lexicographer, author of the original *Webster's Dictionary* and of *Webster's Spelling Book*, born at Hartford, Conn. He left college to serve as a volunteer in the Revolutionary army; after graduation at Yale in 1778 was successful as a teacher at Hartford, Go-

first published in 1784, millions of copies have been sold. After 21 years of labor upon his *American Dictionary of the English Language*, the first edition appeared in 1828, and a second in 1840. This work was the basis of the *Webster's New International Dictionary* now in general use.

Webster-Ashburton Treaty, a treaty concluded at Washington in 1842 by Daniel Webster, then secretary of state, and Lord Ashburton, minister of Great Britain to the United States. It defined the northeastern boundary of the United States and Canada, over which there had long been controversies, and also adjusted the difficulty growing out of the Canadian insurrection in 1837 which had been assisted by citizens of the United States.

Web'worm", a "woolly-bear" caterpillar of the Arctiid Family and one of the most destructive of insects. Its presence is manifested by an unsightly silky nest which is made by the united labors of thousands of the webworms. These nests are hung in plum trees or shade trees of various kinds late in the fall. The eggs, often 400 in a cluster, have been laid there in the spring, and hatch into the pale yellow, hairy spinners. As the caterpillars grow their color becomes more greenish and a darker stripe appears down the side of the back. Longer white hairs, which grow from noticeable black and yellow protuberances, also modify the general color. These larvæ eat the foliage with zeal and render the whole appearance of the tree unsightly. To add to their disagreeableness they have the annoying habit of hanging from the tree by a silken thread just long enough to allow them to swing in the faces of pedestrians or drop upon unsuspecting shoulders.

The caterpillars spin their cocoons in breaks in the bark or in the ground, where they pass the winter. The moths, which appear in late spring, are white or spotted but vary greatly in color and size. The nests should be removed by burning with torches or by cutting and then burning the branches that contain



WEBWORM

A, moth; B, caterpillar.

shen, N. Y., and in Philadelphia, and as a lawyer at Hartford; was a judge of one of the Connecticut courts and served in the Legislatures of both Connecticut and Massachusetts. Throughout his life he was associated with many of the most eminent men of his time, and took an active part in public affairs. He aided in the founding of Amherst College and was the first president of its board of trustees. Of his *Spelling Book*.

them. The pest increases rapidly and especially in trees along country roadsides, where the beauty of the landscape as well as the health of the tree is affected by their presence.

Wedge, *Wej*, a triangular or prism-shaped solid having a very acute angle at one edge; it is used to raise weights by being driven under them or to split bodies by being driven into them. When used, the only force applied is generally a blow which produces an intense pressure for a short time and so can overcome great resistance. A wedge is commonly used in splitting logs or raising weights, and, in general, the principle applies that the mechanical advantage is increased if the wedge is comparatively long. In compound machines the wedge and the lever are frequently combined. See **INCLINED PLANE**; **LEVER**; **MACHINES, SIMPLE**.

Wedg'wood" Ware, the name given certain kinds of pottery invented by Josiah Wedgwood of England. Its chief characteristics are a high grade of enamel, most skillfully ornamented with delicate and artistic decorations in blue, brown and other colors. The original Wedgwood ware was considered worthy to grace the tables of royalty, but recent cheap imitations have greatly lessened its value. See **POTTERY**.

Wednesday, *Wenz' day*, the fourth day of the week. The name is derived from the old Scandinavian deity, Odin or Woden. The Germans call it *Mittwoch* (midweek). See **ODIN**.

Weed, **Thurlow** (1797-1882), an American journalist, born in Cairo, N. Y. He was early left an orphan, and, with scant schooling, began to learn the printer's trade in Catskill, N. Y. When 15 he entered the army as a volunteer, serving during the War of 1812 as quartermaster-sergeant. After the war he edited successively the *Agriculturist* and the *Albany Evening Journal*. He was the original leader of the Whigs and was prominent in William Henry Harrison's and Taylor's administrations. In 1861 he was sent to Europe to prevent foreign recognition of the Confederacy.

On his return he settled in New York City, where he edited the *Commercial Advertiser* until ill health caused his retirement. He wrote *Letters from Europe and the West Indies*, an *Autobiography and Reminiscences*, which appeared in the *Atlantic Monthly* in 1870.

Weeds, flowering plants, which, by overproduction, rapid growth, general lack of economic value and other causes, have become a nuisance. Botanically there are no weeds, since all plants are alike interesting scientifically, and the success of the so-called weeds in the struggle for existence is, to the botanist, a matter for study.

Most of our commonest weeds were brought from Europe, many as medicinal plants, as the burdock, dandelion, tansy, yarrow, etc.; many as seasoning herbs, as various mints; still others were rare, flowering plants in the countries from which they came and were brought for their beauty; as the soil and climate proved favorable they spread so rapidly as to become weeds, such as the white-weed or daisy, hawkweed and common carrot. Lastly, imported grains, wool, and cattle bring in seeds of many other-wise unknown weeds. The general qualities which mark all weeds are their power to live under adverse circumstances and their great production of seed, which assures their continuance. Burdocks, dandelions and milkweeds are examples of plants whose seeds are calculated to spread widely; thistles, nettles and sedges defy grazing animals; mallow, buckthorn and purslane have long, tough roots which are hard to eradicate. Weeds, however, are not only often unsightly, but they take up the moisture and food needed for other plants, adulterate clover seed, making it of poor grade, poison animals, harbor parasites which destroy cultivated plants, shade less coarse plants which need sunshine, or spoil the milk of cows which feed upon their bitter foliage. For these reasons and others, crusades against weeds are commendable. The first means of checking them is by preventing the spread of their seeds. To do

this the flowers should be destroyed before, or as soon as, they open. Dandelions, burdocks and buckthorn must have their roots dug or cut and salt or kerosene placed upon the part still in the ground. Wild mustard, prickly lettuce and thistles are destroyed by spraying with copper sulphate solution. Paths can be kept clear by watering with a solution of sodium arsenate or crude carbolic acid. These sprays are all poisonous and should be so labeled and kept out of the reach of children. Other suggestions concerning means of ridding one's lawns or fields of pests may be secured from state or national departments of agriculture upon application for bulletins.

Weehaw'ken, N. J., a city of Hudson Co., adjoining Union Hill about 3 m. w. of Jersey City, on the Hudson River opposite New York City, and on the West Shore and the New York Ontario & Western railroads. It is one of the largest coal depots in the United States; the coal docks and freight sheds of the Erie Railroad Company and the coal docks of the Delaware & Hudson Canal Company and the Pennsylvania Railroad are located here. Embroideries are largely made and the city has various manufacturing establishments. Weehawken was formerly noted as a dueling ground, and here, in 1804, occurred the duel between Alexander Hamilton and Aaron Burr which resulted in the death of the former. Population in 1920, U. S. Census, 14,485.

Week, a division of time containing seven days. The origin of the week is doubtful. It was known among Eastern peoples from a very ancient time. With the Hebrews the seventh day was sacred, and the fact that the Sabbath is so often mentioned in connection with the new moon in their literature suggests that the week may have been a division of the month corresponding to the quarters of the moon. This, however, does not account for the division of the week into seven days. A possible explanation of the present arrangement into seven days and the naming of the days is suggested

by the fact that in the Egyptian astronomy seven planets were known and each planet was assigned an hour of the day over which to preside. See CALENDAR; DAY; MONTH; YEAR.

Wee'vil, a group of beetles of the Curculio Family. In the adult stage these insects are destructive of the leaves and fruit of many trees, and the larvæ also do great damage. The eggs are laid singly in holes pierced in the bark or fruit of the tree, and hatch into white, footless maggots which eat the fruit and leaves. The names weevil and curculio are often used interchangeably, but the former is oftenest applied to the strawberry, apple, acorn and cotton pests. The apple weevils go through their entire development within the apple and emerge as adult insects. The strawberry weevil punctures the flower bud so that it falls and the larvæ feed upon it on the ground. See CURCULIO; COTTON-BOLL WEEVIL; COLEOPTERA; INSECTICIDE.

Weighing, Wa'ing, Machines, instruments employed in finding the weight of bodies. They are based on the principle of even balance.

Balances, in their simplest and most common form, consist of a horizontal beam pivoted and supported at its middle, with a scale pan suspended at the end of each arm. These are shallow circular pans. In one is placed the article to be weighed, and in the other metal weights are used to determine the measure. When carefully made, this style of balance will indicate the greatest precision. It is, therefore, used for weighing drugs, and for delicate operations, in which case the weighing is done in a glass case to avoid air currents.

Spring balances operate on the principle of drawing out or uncoiling a steel spring, to which is attached a pointer. In the form used for domestic purposes, this pointer runs through a slot, on one side of which is a scale graduated in pounds and ounces. Using a good quality of spring and a circular dial, a machine which gives quick action in indicating weight is produced. This form is

used by grocers, butchers, etc. It is sometimes hung suspended from above and frequently arranged as a counter scale. Various modifications in the form of the dial are made for different purposes, such as postal scales to indicate the postage on letters, periodicals and newspapers by means of figures on the dial.

Computing scales for stores have modifications of these dials to show the total price for different quantities of merchandise sold, and are in the main accurate. They save considerable time and avoid errors in calculation, and are, therefore, in general use.

Torsion balances are employed to determine the intensity of minute forces in laboratory and research work. See WEIGHING SCALE.

Weighing Scale, a mechanical device for weighing. In its simplest forms it is represented in the balance and the steelyard, which are described under their respective titles. The simplest form of weighing scale next to the balance and steelyard, and commonly known as the counter scale, consists of an iron standard, on the top of which a lever with unequal arms (See LEVER) is supported on a pivot. The short arm of the lever supports a frame, which holds in position a peculiarly shaped vessel called the scale pan. The long arm contains a graduated scale marking pounds and fractions of a pound, and terminates in a device for attaching weights. The article to be weighed is placed in the scale pan, and weights indicating the number of pounds are attached to the long arm of the lever to balance it. A sliding weight moving over this arm enables one to obtain the exact weight in pounds and ounces. Scales of this type are usually limited in their capacity to about ten pounds.

The platform scale, used for weighing heavy articles, consists of a platform supported on a series of levers, so arranged that the long arms of one set rest upon the short arms of a second set by means of pivots extending upon each side of the levers. The long arm of the last

lever of the series is joined to the short arm of the scale beam, whose long arm has a graduated scale and a movable weight. The capacity of the platform scale depends upon the number of levers in the series and their length. They vary in size from the small platform scale on the grocer's counter to the railroad scale, on which the heaviest locomotive can be balanced by the weight of a child's hand.

The weighing scale was invented by Thaddeus Fairbanks of Vermont in 1831, and it is now found in all parts of the world. Many patterns have been devised, but all depend upon the principle of the lever. See WEIGHING MACHINES.

Weights and Measures. The necessity of a uniform system by which articles may be compared as to their bulk is so apparent that it is not surprising that the origin of our present "tables" is lost in a distant past. Wherever the slightest trade relations were carried on, some standard to which the interchanged articles might be referred was necessary. Gradually, systems of measures have evolved, differing in different countries but similar in that all have three kinds of measures, those of length, of surface and of capacity, and a system of weights. Every civilized country has its carefully constructed standards which are the acknowledged authorities by which questionable instruments of measurement may be tested or adjusted. For these the greatest accuracy is necessary in order to maintain the standards at a correct, uniform and invariable size.

The first measures used were not so uniform, however, but had their origin in the human body, as many of the present names, or those formerly used, bear witness; as *foot*, *digit*, *palm*, *span*, *nail*, *arm*, etc. The Babylonians, Persians, Greeks and Romans all had well-systematized tables, and as early as 1650 an English book was in existence giving the tables then in use. These were plainly a legacy from the Saxons with but few Roman modifications. An old English statute of the time of Edward

II states that the length of three barley corns, round and dry, shall constitute one inch and that 12 of these inches shall be the length of one foot.

At the time of the Revolutionary War the measures used in the colonies were the same as those used in England, but as the colonies were widely separated the differences that crept in made inter-colonial trading very difficult. The Articles of Confederation gave Congress the right to "coin money and fix the standards of weights and measures," a right also given it later by the Constitution. But Congress, while seeing the need of regulating the coinage of money, paid little heed to the latter part of the section, although urged repeatedly to do so by Washington. During this time the states had acted independently and the resulting confusion made Federal action a necessity. In response to a resolution of Congress passed in 1817, John Quincy Adams, then secretary of state, made a careful examination of conditions in the United States and embodied his findings in an interesting and dignified report, which was published in 1821. This report was the means of starting definite action, and to Adams we are indebted for the present accuracy of our system. The weights and measures adopted in consequence of his report were the now familiar ones, making 36 inches equal one yard; 7000 grains, one pound avoirdupois; 231 cubic inches, four quarts, or one gallon; 2150.42 cubic inches, one bushel. In 1828, a brass troy pound weight was secured by Albert Gallatin, United States minister at London, for use in the National Mint at Philadelphia. This was sent to the United States by a special messenger, and in 1830 the weights and measures of the various custom-houses were corrected by means of it. This pound is the standard unit of troy weight. The troy ounce is one-twelfth of a pound. At the same time the superintendent of the coast survey was given the task of making standards for all the weights and measures. By 1850 these had been made and supplied to all of the states. Sets of these are

also presented to each new state as it is admitted. In 1866 the metric system was legalized in the United States. The mile is a measure that originated with the Romans, but had a varying value as adopted by Western nations. The English statute mile, used in Great Britain and in the United States, is 320 rods, or 5280 ft. The geographical, or nautical, mile is $1/21,600$ of a great circle of the earth, but since the earth is not a perfect sphere, it has different values: that adopted by the United States Coast Survey is 6080.27 ft., and that in use in the British Hydrographic Office and called the Admiralty mile is slightly less.

Following a number of conferences called by the French Government, an international bureau of weights and measures was established in 1875 with headquarters near Paris. Its object is the maintaining of accurate standards for trade relations. The bureau of standards of the United States was established in July, 1901, and is now a part of the department of commerce. It has charge of the carefully prepared standards kept at Washington for the final test of accuracy or for the making of new measures. See METRIC SYSTEM.

Weir, Weer, Robert Walter (1803-1889), an American portrait and historical painter. Educated at the National Academy of Design, he became a teacher of drawing at West Point Military Academy, holding position as such 42 years. Chief among his canvases are *The Embarkation of the Pilgrims, Columbus before the Council of Salamanca*, and *Virgil and Dante Crossing the Styx*.

Weld'ing, the process by which an intimate union is produced between the surfaces of two pieces of malleable metal by heating nearly to fusion and hammering. When two bars or sheets of metal are properly welded, the point of junction is as strong as any other part. Iron is the only metal that is practically welded by ordinary methods. See WELDING, ELECTRIC; ACETYLENE; BLOWPIPE.

In welding iron bars the ends that are to be joined are heated until they attain, near the fusing point, a plastic

or slightly viscous condition. The parts to be welded are then placed in contact with each other, and are either hammered together by a succession of blows or forced to make a junction by a great pressure on the soft parts. Before welding, the metal must be clean and free from grease, and in order to prevent the iron from oxidizing from the oxygen in the atmosphere, borax or some other fluxing material is used.

Welding, Electric. In order to obtain great heat to fuse metals for welding, brazing, etc., the electric current is employed. Of the various means and processes used, the one developed by Elihu Thomson is considered the most practical and is in most general use. Welding currents are produced in this process by a special transformer working on the resistance principle instead of the electric arc method, so that a large current (amperage) with very low pressure (voltage) is sent through the joint to be welded, producing a heat in the pieces of metal on each side of the joint. The two pieces held by suitable clamps are pressed together when at the proper temperature and form a perfect weld without lapping or shortening (a butt weld). Practically all kinds of metals can be welded by this process, as well as pieces whose shape would prevent their being welded in the ordinary manner. The apparatus takes different forms, depending on the shape and size of the work. For joining two wires the mechanism for clamping is very simple, while for welding pipe, or tubes of large diameter, machines of special form are required. The largest steel rails are easily and quickly welded by this process. See **ELECTRICITY**.

Wel' land, Ont., an industrial city and the county seat of Welland County, 30 miles northwest of Buffalo, N. Y., on the Welland Canal and on the Canadian National, the Michigan Central, the Canadian Pacific, the Pere Marquette, and the Wabash railroads. It has manufactures of iron, brass, and steel, machinery, foundry products, textiles, fertilizers, etc. It was founded in 1788, and incorporated as a village in 1858, as a town in 1877, and as a city in 1918. Population, 10,000.

Welland Canal, an important Canadian ship canal, 27 miles long, connecting lakes Erie and Ontario, whose only natural link, the Niagara River, is not navigable because of the great falls. It extends from Port Colborne to Port Dalhousie, Ont. The original canal, begun in 1824 and completed in 1833, was greatly enlarged in 1871 to a

depth of 14 feet, and in 1913 a new canal was begun, which was completed in 1930 at a cost of \$50,000,000. This canal is 200 feet wide at the bottom and is 25 feet deep, with provision for deepening it to 30 feet. Whereas the old canal had 26 locks, the new one has but 7 huge double locks, each with a lift of 46 feet, 6 inches. The canal is of great commercial importance as a link in the water route from Duluth or Chicago to the Atlantic Ocean. It also furnishes an inexhaustible supply of water for manufacturing.

Well Boring, a method of sinking wells for the purpose of obtaining water, petroleum or natural gas, or for prospecting for minerals. The machinery used consists chiefly of a derrick which may be either stationary and 70 ft. in height, as used in drilling oil wells, or of lesser height and portable, like devices used in boring for water. Various drills, bits and augers are used, with devices for holding them securely, and a windlass to raise and lower them, together with an engine or a horse-power machine to do the work. In boring a well through the hard stratalike rock, the drill or auger is allowed to fall by its own weight, and a rod is arranged to turn it as it strikes the bottom of the well. When the auger is filled with material, it is raised by the windlass to be cleaned, after which it is allowed to drop down again and strike a succession of blows. The motion is imparted to the drill by a rope attached to a revolving drum, or trunnion head, in such a manner that when the drill has been raised to a height equal to half the circumference of the drum, it is thrown off and the drill falls by its own weight. Since the drill usually weighs over 100 lb., the blows are very effective. A pumping device is also provided in case water rises in the well.

For prospecting for the precious metals or for coal, iron ore, etc., where it is required to go through very hard formations, and particularly where samples are required for assaying or estimating, a so-called diamond core drill is employed. This consists of a tube made with thick walls carrying on the end a number of black diamonds, with cutting edges. This device is sunk down by boring like

an auger, and when withdrawn the core inside the tube is examined in order to determine the nature of the rock. See PETROLEUM; NATURAL GAS.

Welles, Welz, Gideon (1802-1878), an American statesman, born at Glastonbury, Conn. He studied law under Judges Williams and Ellsworth, and in 1826 became a power in the Democratic Party as editor of the *Hartford Times*, supporting Jackson for the presidency. From 1827 to 1835 he served in the Connecticut Legislature, where he advocated the abolition of imprisonment for debt, and later was comptroller and postmaster. He joined the Republican Party in 1855, and in 1861 became secretary of the navy in the cabinet of President Lincoln, filling this office with rare ability until 1869.

Wellesley, Welz'ly, Richard Colley Wellesley, MARQUIS (1760-1842), a British general and statesman, brother to the Duke of Wellington. He was born in Dublin, of one of the most ancient of Irish families, and distinguished himself at Eton and Oxford. In 1781 he took his seat in the Irish House of Peers, and three years later was elected to the English House of Commons, shortly becoming a favorite with George III. Accident having directed his attention to India, in 1798 he arrived there as governor-general, and in 15 months annihilated French influence and reduced Mysore, Seringapatam being captured and Tipu Sahib being slain. For this service he was created Marquis Wellesley in the Irish peerage. He was later successful in the Mahratta War. His rule in India was wise and moderate; he did much to improve the civil service. In 1809 he went to Spain as ambassador, and in the same year he became secretary of state for foreign affairs, in which capacity he advocated repealing the penal laws which affected Catholics. From 1821 to 1828 and from 1833 to 1834 he was viceroy in Ireland.

Wellesley College. See WOMEN, COLLEGES FOR.

Wellington, the capital of New Zealand, situated on the southwestern shore

of North Island. Port Nicholson, an inlet of Cook's Strait, forms an excellent harbor, and behind the city rises a range of steep hills. The prominent buildings include the fine town hall, founded by the Prince of Wales in 1901, the government buildings, Victoria University, several public libraries, a school of art, the museum, an observatory, the courthouse and several fine churches. A harbor board controls the shipping; railways and hydraulic machinery add to the conveniences of the large wharves. The city was founded in 1840 and was made the capital in 1865. Population, about 115,000.

Wellington, Arthur Wellesley, DUKE OF (1769-1852), a British general and statesman. Entering the army in 1787 he was sent to India in 1796. He distinguished himself in the Mahratta War of 1803-05, winning the battle of Assaye and proving himself a strong military strategist. In 1807 he served at the bombardment of Copenhagen and later was made chief secretary for Ireland. The next year he began his famous campaign in Spain, and from this time was engaged in England's long struggle against Napoleon. He received substantial rewards, which culminated in his being created Duke of Wellington in 1814. When Napoleon returned from Elba, Wellington, with the aid of the Germans under Blücher, met and defeated him at Waterloo (See WATERLOO, BATTLE OF). He was employed later in important governmental affairs, and became prime minister in 1828. Wellington was highly esteemed for his moderation, honesty and high sense of duty.

Wells, Herbert George (1866-), an English novelist, born at Bromley, Kent, and educated at Midhurst Grammar School, at the Royal College of Science and at London University. He began his literary career by writing for periodicals, being dramatic critic for the *Pall Mall Gazette* in 1895. After the success of his fantastic story, *The Time Machine*, he devoted much of his time to writing romances in which he set forth his views on politics and sociology. He

ranks high among 20th-century novelists and displays much skill in character portrayal and an equal faculty for invention. His works include *Anticipations*, *Mankind in the Making*, *The Food of the Gods*, *A Modern Utopia*, *The War in the Air*, *Marriage*, *Mr. Britling Sees It Through*, *Outline of History* and *The Salvaging of Civilization*.

Werewolf, *Weer' wolf*", a term meaning man-wolf. A superstition, generally current during the Middle Ages and not yet wholly extinct, held that certain men, either periodically or at any time, possessed the power of transforming themselves into wolves. The wolf thus formed possessed the appetites of both the man and the wolf and had a remarkable appetite for human flesh. The werewolf was, therefore, the most formidable antagonist man could meet and was universally feared. No country seems to have been wholly free from this superstition.

Weser, *Va' zer*, a river of Germany. It is formed by the confluence at Münden of the Werra and the Fulda, flows north and enters the North Sea through a wide estuary. From the source of the Werra it is 447 m. long; from the junction of the two streams, 280 m. It is navigable its entire course, and under high water vessels can ascend the Werra. A canal connects its estuary with that of the Elbe.

Wes'ley, Charles (1707-1788), an English hymn writer, the brother of John Wesley. He was born at Epworth, where his father was rector. At Oxford, which he entered in 1726, he united with some friends, the "Holy Club," in the observance of a strict system of life. The method pursued by these students gained them the nickname of Methodists, which later was applied to the Church founded by John Wesley. Associated with Charles was his brother John, and George Whitefield. He was ordained in 1735, shortly after which he accompanied his brother in a Georgia missionary trip. After his return to England, where he at first acted as curate in Islington, he entered upon the work

of an itinerant minister. This work he continued for 17 years, but he did not favor the tendency of the Methodist Societies to separate from the Church of England. The name of Charles Wesley is a household word to many because of the hymns he wrote. Over 6000 in number, many of these are still used constantly in religious services.

Wesley, John (1703-1791), an English preacher, honored by Methodists as the founder of their Church. He was born at Epworth, Lincolnshire, the son of a clergyman. He studied at Charterhouse and at Christ Church, Oxford, taking his degree in 1724. Following this he entered the ministry and was ordained priest in 1728. Not long after, being recalled to Oxford by college regulations, Wesley became interested there in an association called by outsiders the "Holy Club," one of the members of which was his brother Charles. Of this movement John Wesley soon became the director. The next important step in his life was a journey to Georgia as a missionary, under Oglethorpe. While on the voyage he fell in with some Moravian Brethren, whose earnestness and piety impressed him greatly. Later, he sought them out in London, thereby learning their doctrine of saving faith.

Wesley now devoted much time and thought to deepening his religious experience, became associated with the great exhorter, George Whitefield, and in 1739 preached his first open-air sermon, thus beginning his real life work. His success in winning converts in the vicinity of Bristol was remarkable, and he also began to form those Societies which were the beginnings of Methodism. Five years after he preached his first sermon he had 45 preachers associated with him, while the number of those who united with the Methodist congregations steadily grew. In 1790 the Methodists numbered 120,000. Wesley accomplished a remarkable amount of work. He preached from two to four times a day, wrote and edited, gave his aid for the improvement of humanity and kept in close touch with all the de-

tails of the Methodist Societies. In England of the 18th century, "no single figure influenced so many minds, no single voice touched so many hearts." See METHODISTS.

West, Benjamin (1738-1820), an American historical painter, born in Springfield, Pa., of Quaker parentage. At the age of 18 he opened a studio as a portrait painter, afterwards moving to New York. In 1760 he went to Italy for study and there was made an honorary member of the academies of Florence, Bologna and Parma. After three years' study in Italy he went to London, where he permanently settled. His *Agrippa Landing with the Ashes of Germanicus* brought him fame, and with the friendship and encouragement of Sir Joshua Reynolds he obtained royal patronage. His revolutionary act in discarding the prevailing convention of painting figures in modern battles wearing the costumes of antiquity was epoch-making, and finally abolished the absurd practice. West was one of the founders of the Royal Academy and at one time president. He produced a large number of pictures. Examples of his work in America are *Christ Healing the Sick* and *Penn's Treaty with the Indians*, in Philadelphia; and *Kingdom*, in the Boston Museum.

Westbrook, Me., a city of Cumberland Co., 6 m. n.w. of Portland, on the Presumpscot River, and on branches of the Maine Central and Boston & Maine railroads. Electric car lines extend to Portland. There are manufactories of silk, cotton and woolen goods, flour, paper, cotton warp, seamless bags and other commodities. Westbrook was part of Falmouth until incorporated as a separate town in 1814. The Walker Memorial Library is located here. A city charter was granted in 1889. Population in 1920, 9435.

West Chester, Pa., county seat of Chester Co., 27 m. w. of Philadelphia, on the Pennsylvania and the Philadelphia, Baltimore & Washington railroads. The educational institutions are a state normal school, one of the largest in

America, Villa Maria Academy, Darlington Seminary, Friends' Select School and West Chester Business College. The town is situated in a productive farming section, known for its grain interests and having extensive nurseries. It was originally called Turk's Head, but in 1786 the county was divided, and the name was changed to West Chester when it was made the county seat. Marshall Square, with its botanical gardens, and Turk's Head Hotel, dating from pre-Revolutionary times, are among the noteworthy features. West Chester was founded in 1784, incorporated as a town in 1788 and chartered as a borough in 1799. Population in 1920, 11,717.

Wes'terly, R. I., a town and noted summer resort of Washington Co., 44 m. s.w. of Providence, on the Pawcatuck River and on the New York, New Haven & Hartford Railroad. Small vessels ascend the river to this place. The town contains five villages, each having its own post office. Westerly has large granite-quarrying interests, as a superior quality of granite is found here. There are manufactories of cotton and woolen goods, printing presses, thread and twine. Noyes Beach and Watch Hill, two of the villages contained in the town limits, are noted summer resorts having excellent bathing beaches. Norwich and New London, Conn., and Watch Hill Point enter Westerly by electric car lines. The Indian name, Misquamicut, was retained by the white settlers for a time. In 1669 the town was incorporated under its present name. Population in 1920, U. S. Census, 9,952.

Western Australia, the westernmost state of the Commonwealth of Australia, occupying more than one-third of the entire continent. It is the largest of the Australian states and has an extent of 975,920 sq. m., but owing to its extensive desert regions and marshes only a comparatively small part is available for agricultural purposes. About 100 m. from the western coast are mountains of moderate height. In this section are many rivers, though of these the Swan alone is important; in the hot dry months

the beds of the outer streams frequently become dry. The southwestern portion of Western Australia is its most productive part, and great forests of eucalyptus, the tallest tree that grows, and sandalwood furnish valuable products. Grazing and agricultural land is also found here, and live stock, including sheep, horses, cattle, pigs, goats, and camels, are herded upon the grassy plains. Wheat, maize, barley, oats and potatoes are the chief farm crops, although considerable space is given over to peaches, grapes, oranges, lemons, apples and other fruits.

Gold, found almost throughout this section, is one of the chief resources. The settlement of Western Australia began in 1829. Since 1901 it has been a state of the Commonwealth. Its government is administered by a governor appointed by the British Crown and a Legislature consisting of two houses. Perth, a port in the southwestern part and upon the Indian Ocean, is the capital and the largest city. Population, about 400,000.

Western Reserve, the name given to a strip of land, in what is now northern Ohio, which was retained by Connecticut when, in 1786, she ceded to the United States her claim to the western lands. Under her charter of 1662 Connecticut was made to extend from sea to sea. This strip, about 70 miles wide, extended 120 miles westward from the western boundary of Pennsylvania. In 1795-96 the greater part of this territory was sold for \$1,200,000 to 48 men who afterwards formed the Connecticut Land Company and in 1796 began a survey. The proceeds which Connecticut received from the sale were set aside as a "permanent fund, the interest from which should be appropriated to public schools." Settlement was at first slow, due to doubt concerning the title, but after 1812 it was rapid and was largely from Connecticut and other New England states. The name is preserved in Western Reserve University in Cleveland.

Westfield, Mass., a manufacturing center of Hampden County, 9 miles west

of Springfield, on the Westfield River and on the New York, New Haven & Hartford and the Boston & Albany railroads. It has a fine municipal airport, Barnes Airport. Tobacco-raising and market gardening are profitable industries of the vicinity. The most important of Westfield's varied manufactured products include steam and hot-water boilers and radiators, bicycles and scooters, textile machinery, cigars, envelopes, paper, boxes, thread, abrasive powder, whips, golf clubs, fish lines, and corundum wheels. More than 95 per cent of all the whips used are made in Westfield. The city is the seat of a state normal school established in 1839, and of a state trade school for boys. It has a tuberculosis hospital for children and an old ladies' home. Westfield was settled as early as 1642 on the site of an Indian Village. It was known as Woronoco until it was incorporated as a town in 1669. It received a city charter in 1921. Population, 19,500.

West India Company, Dutch, a commercial company chartered by the States-General of United Netherlands in 1621. The company was granted the monopoly of trade with America for 24 years and had the right to make war and form alliances. It colonized and governed New Netherland until 1664. It also controlled some of the West India Islands and a part of Brazil. In 1647 the company was rechartered for 25 years, but when the English gained possession of its American territory it lost its influence in the New World.

West Indies, In' diz, or **Antilles, An til'eez**, a group of islands of the Western Hemisphere, lying east of Central America and forming the northern and eastern boundary of the Caribbean Sea. They comprise three great groups, the Bahamas, the Greater Antilles and the Lesser Antilles; their total area is about 92,000 sq. m. The first of these groups consists of about 700 small islands lying northeast of Cuba and east of Florida; the Greater Antilles include Jamaica, Cuba, Haiti, Porto Rico and several small adjacent islands; the Lesser An-

AMERICAN INFLUENCE IN THE CARIBBEAN SEA

America's interest and influence in the Caribbean Sea region originated in her early territorial expansion. The purchase of the Louisiana territory from Napoleon in 1803 and the acquisition of West and East Florida in 1810 and 1819, respectively, made it necessary for the United States to dominate the Gulf of Mexico to protect New Orleans and the commerce of the Mississippi River. The Monroe Doctrine of 1823 foreshadowed intervention in the affairs of the Central American, South American, and West Indian republics already formed or those to be formed. For, notwithstanding the Monroe Doctrine, the European powers have on numerous occasions plotted for the annexation of the territory of Latin American republics or the establishment of protectorates over them. Their motives were the enlargement of their colonial possessions, access to raw materials, expansion of their trade and commerce, and the protection of their citizens or property interests. The United States has opposed these policies because of danger to her peace and safety, and because they would prevent her from developing these regions.

The struggle of Europe for rubber, sugar, and other tropical products, as well as oil and the precious metals, has been a temptation to foment revolutions for the purpose of gaining these products. It is a fact that Central America has been the scene of more revolutions in a hundred years than any other region of equal area in the world, and not a few of them have been made to order by rival foreign groups seeking concessions. Thus the United States has often been forced to intervene or else abandon the Monroe Doctrine together with the opportunity for the expansion of trade, and the exploitation of the rich natural resources of these regions.

The development of the Panama Canal projects was a cause for still further interest in the Caribbean Sea, because of the relation of the canal to the safety of the United States in case of an attack on her Pacific coast or her new possessions in the Far East—the Philippines. Finally, the Spanish-American War of 1898, the cession of Porto Rico, and the establishment of a virtual protectorate over Cuba forced the United States to take a still greater interest in the Caribbean. Since 1898 there has been further acquisition of territory, strategic points have been occupied, and coaling and naval stations and a number of protectorates or spheres of influence have been established.

Besides the general reasons for expansion and influence in this region, President Roosevelt, in his messages of 1903 and 1904, extended the application of the Monroe Doctrine and asserted that the rights and interests of the United States made it necessary for her to intervene in the internal affairs of Latin American republics whenever there was "chronic wrong doing" on their part and failure to maintain law and order. As a result, there have been numerous occasions when United States marines have landed to put down revolutions or protect American property interests. There has been military occupation of territory, extending sometimes over a period of years, or the exercise of some control over the financial administration and the customs revenue of various republics. This practice was often due to the desire of the United States to prevent military occupation by European powers for the purpose of collecting debts owed their nationals by the Latin American republics.

Cuba

When Cuba was made independent, by treaty with Spain in 1898, it was placed by the United States under a military government for some years and then it was granted semi-independence. The famous Platt Amendment to the treaty provides for intervention in case of need; that is, when it is necessary to maintain an orderly government and protect life and property. Treaties cannot be made by Cuba without





Hammond's & Co. 11 Map of West Indies
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the consent of the United States. Intervention has occurred once and has been threatened several times, with the result that Cuba is seeking complete independence. The Platt Amendment also provided for lands for coaling and naval stations. Guantanamo on the southern coast of Cuba is a naval base under control of the United States. The Isle of Pines, however, in 1925, was restored to Cuba.

Panama

In the revolution of 1902, Panama broke away from Colombia and established a republic. Panama by treaty quickly ceded to the United States a strip across the isthmus 10 miles wide, known as the "Canal Zone," with the right to fortify it and obtain additional naval stations. A virtual protectorate over the republic of Panama has been established by the United States.

Haiti

As early as 1871 a treaty was made proposing annexation of Haiti to the United States, and it failed of ratification in the Senate by only one vote. By 1912 the interest on the heavy debt held by German, French, and English investors was in default, and Germany was seeking a coaling station and control of the Haitian customs. French marines were landed in 1915. As a result, to safeguard the Monroe Doctrine, American marines were landed in August, 1915, and the government was taken over by the United States. In 1916 military occupation, appointment of a high commissioner, control of the customs, and a financial adviser followed. Restoration of law and order, sanitation, building of roads, and partial payment of the debt was accomplished. In June, 1924, the marines were withdrawn, but an American receiver general of customs was provided to collect taxes, to be nominated by the President of the United States.

Dominican Republic

In 1905, President Roosevelt made a treaty with this negro republic whereby the United States was to administer the customs revenue under a commissioner of customs and adjust the Dominican international obligations. Debts were held by England and France and threats of intervention had been made by Spain and Germany. A second treaty in 1907 gave the United States complete control of finance and the right to appoint a general receiver of customs. Due to revolutions United States marines were landed in 1912 and again in 1916. Military occupation followed, with a military governor and financial adviser appointed by the United States. Though troops were withdrawn July 12, 1924, the United States continues to administer the Dominican customs and will do so for fifty years from 1907, for the purpose of liquidating the debt. As in the case of Haiti, good government, promotion of agriculture, sanitation, schools, and payment of debts have resulted.

Nicaragua

Nicaragua is one of the six Central American republics. The others are Guatemala, Honduras, Salvador, Costa Rica, and Panama. This region was a goal for filibustering expeditions before the Civil War, when the southern leaders were seeking new territory for the extension of slavery. The property interests of American citizens, the possibility of an isthmian canal, and the necessity for the United States to protect European creditors or else abandon the Monroe Doctrine, and finally a revolution in 1912 led to intervention and the landing of United States marines to preserve order. A collector of customs and two out of three members of a claims commission are appointed by the United States. A treaty made in 1914 provides for the sale to the United States for \$3,000,000 of a canal route. The United States has also acquired a lease of the Corn Islands and the Gulf of Fonseca for a naval base. The government has been maintained by military force with complete control of the finances.

Porto Rico

This island was ceded to the United States by Spain in 1898 and is now almost a self-governing territory, only four important offices being under United States control, namely, those of governor, commissioner of education, auditor, and attorney general.

Virgin Islands

These islands, St. Thomas, St. Croix, and St. John, were acquired by the United States from Denmark by purchase in 1916 and are under a provisional government administered by the navy.

Other Interests of the United States in the Caribbean

The United States has from time to time had other interests in the Caribbean and has temporarily or permanently occupied territory, notably several small islands, or has intervened in the internal affairs of several Latin American republics, as in the case of Venezuela in connection with the boundary dispute with Great Britain; of Mexico when Vera Cruz was occupied, and of Honduras when United States marines were landed in April, 1925. It is thus apparent that the Monroe Doctrine, the necessity of protecting the rights of American citizens and their property, the safety of the Panama Canal, the opportunity to exploit these regions and to expand trade and commerce, are the main reasons for American influence in the Caribbean Sea.

Marcus Wilson Jernegan.

illes include the Windward Islands and other small islands and rocks. All of the islands lie within the warm seas, and the climate is everywhere tropical. The vegetation also is tropical in character and the fertile soil yields generally a rich return. The West Indies are chiefly isolated highlands or mountain peaks of the North American or South American systems.

Politically the West Indies are divided among various nations. Cuba and the Island of Haiti, which includes the two republics of Haiti and Santo Domingo, are free. Great Britain owns the Bahamas, Jamaica and its dependencies, the Windward Islands, the Leeward Islands, Tobago and Trinidad; France owns Guadeloupe, Martinique and a part of St. Martin; to Netherlands belong the remainder of St. Martin, Curaçao, Bonaire, Aruba, St. Eustache, or St. Eustatius, and Saba; to Venezuela, Tortuga, Hermanos, Margarita and other small islands off the coast of South America; St. Thomas, St. John and Santa Croix, or Santa Cruz, and Porto Rico to the United States.

The West Indies were the first discovered region of the New World and received their name because they were supposed to be the long-sought Indian coast. See CUBA, THE REPUBLIC OF; HAITI; MARTINIQUE; JAMAICA.

West'inghouse", George (1846-1914), an American engineer and manufacturer, the inventor of the air brake, born in Schoharie County, N. Y. He attended Union College one year, having previously spent considerable time in his father's machine shop and having invented, when but 15, a rotary engine. He served during the latter part of the Civil War, and following it he invented a device for replacing derailed railroad cars, the air brake, in 1868, and various signaling devices. Despite great opposition, he introduced into America the alternating current system of electrical distribution for light and power; he built the ten original dynamos for Niagara and those for the elevated and subway roads in New York and for the London Metro-

politan Railway; he devised a system for controlling and utilizing natural gas and developed gas and steam engines; and he established various plants for the manufacture of air brakes and other machinery in the United States and Europe. He has an interest in corporations which employ about 50,000 men and have an aggregate capital of \$120,000,000. Mr. Westinghouse aided Tesla financially in developing the induction motor.

West'min'ster Abbey, or The Abbey of St. Peter, the most widely known church of England and, perhaps, of the world. It lies in the district of Westminster, London, upon the Thames, not far from the Houses of Parliament. Tradition says the original church, which was a Benedictine abbey, was founded by Sebert, King of the Saxons, and was blessed by St. Peter himself. The church as it now stands was really begun by Edward the Confessor and was practically completed during the 14th century. It is built in the form of a cross 531 ft. long and 203 ft. across its transepts; its height is a little more than 100 ft. The two towers are 225 ft. high. Many changes and additions have been made since the Abbey was first completed, but, in the main, Gothic style predominates. The chief interest in the church lies in the facts that it has been the place of the coronation of all the kings of England, except Edward V, from the time of William the Conqueror, and that it is the burial place of many of the greatest of English sovereigns and subjects. The coronation ceremony takes place in the choir. The coronation chair of the king contains beneath its seat the famous stone of destiny brought from Scotland, but which tradition says was Jacob's pillow. Many memorials, cenotaphs and tombs crowd the Abbey even to the choir. The north transept is given to memorials of warriors and statesmen, while the south transept, known as the Poets' Corner, is given over to personages of literary fame. In the latter stands the bust of Longfellow, the only American to whom a memorial has been erected in the Abbey.

West Orange, N. J., a town of Essex County, adjoining Orange and 12 miles west of New York City, on the Erie Railroad. It is delightfully situated at the base of Orange Mountain. Eagle Rock (600 ft. high), in Essex County Park, commands a magnificent view of New York City and its harbor. The town's chief industrial establishments are the Edison Storage Battery, Phonograph, and Radio Works. Population, 18,600.

West Palm Beach, Fla., a resort and agricultural center of Palm Beach County, on Lake Worth and on the Seaboard Air Line and the Florida East Coast railroads. It is a sister city to Palm Beach, with which it is connected by bridges and ferries. Population, 20,000.

Westphalia, *West fa' li a*, Peace of, the treaty which closed the Thirty Years' War. The war had brought the affairs of Europe into hopeless confusion. Commerce and industry had been ruined and law and order forgotten. All parties desired peace, but each wanted a peace in which it would gain special advantages. The congress which led to the treaty opened in 1644 in two sections. Representative of France, the Holy Roman Empire, Spain and the German Catholics met at Münster; those of Sweden, the Holy Roman Empire and the German Protestant states at Osnabrück. Switzerland, the United Provinces, Portugal, Savoy, Tuscany, Mantua and Lorraine were also represented. The discussion which terminated in the celebrated Treaty of Westphalia, signed Oct. 24, 1648, continued for four years.

The provisions of the treaty were of two classes, political and religious. By the political provisions, the Holy Roman Empire lost Switzerland and United Netherlands, which were given their independence. The claim of France to the bishoprics of Metz, Toul, and Verdun in Lorraine was confirmed, and Alsace, excepting the free city of Strassburg, was given to France. Sweden was granted territory in northern Germany, which gave her command of the Oder, the Elbe, and the Weser, thus enhancing her maritime strength. Many minor changes were made within the empire, the most important being additions to the territory of Brandenburg.

By the religious provisions of the treaty, Calvinists, Lutherans, and Catholics were placed on the same footing. With some reservations, every prince was empowered to make his own religion that of his people, and to banish those who refused to accept his creed, but those banished were to have five years in which to emigrate. By historians the Peace of Westphalia is considered an epoch-making event in universal history. It marks the end of the Reformation period and the beginning of that of political revolution.

West Point, N. Y., a village of Orange County, situated on the west bank of the Hudson at the northern entrance to the Highlands and about 50 miles north of New York City. It occupies a beautiful site on an elevated plateau, and is the seat of the United States Military Academy. During the Revolutionary War it was an important strategic point, and in 1780 it was commanded by Maj.-Gen. Benedict Arnold, who tried to betray it to the British. See MILITARY ACADEMY.

West Springfield, Mass., a manufacturing town of Hampden County, on the Connecticut River opposite Springfield, and on the Boston & Albany Railroad. The leading industry is paper-making. Other products include gasoline tanks and ignition systems, and there are railroad repair shops. The town was separated from Springfield in 1773. Population, 15,800.

West Virginia, *Ver jin' i a*, THE PANHANDLE STATE, one of the South Atlantic States, is bounded on the n. by Pennsylvania and Maryland, on the e. by Maryland and Virginia, on the s. by Virginia, on the s.w. by Kentucky and on the n.w. by Ohio. It is separated from Maryland on the n. by the Potomac River, and from Ohio by the Ohio River. The boundary is very irregular.

SIZE. The greatest length from north to south is 340 m. and from east to west, 245 m. The area is 24,170 sq. m., of which 148 sq. m. are water. It is about four-fifths the size of Maine, nearly three times the size of Massachusetts and the 40th state in area.

POPULATION. In 1920 the population was 1,463,701. From 1910 to 1920 there was a gain in population of 242,582, or 19.9 per cent. There are 60.9 inhabitants

to the square mile and the state's rank in population is 27.

SURFACE. Parallel ranges of the Allegheny Mountains extend in a southwesterly direction across the eastern part of the state, and at the south unite with the Cumberland Plateau. These ranges are separated by long, narrow valleys and are cut by numerous cross valleys. The altitude increases from 260 ft. above sea level at Harper's Ferry to 4860 ft. at the summit of Spruce Knob in Pendleton County. There are numerous other peaks in these ranges, varying in altitude from 2000 to 4800 ft.

To the northwest of these mountain ranges is the Allegheny Plateau, which comprises about two-thirds of the state. The general slope of this region is to the northwest. It is dissected by many streams flowing through narrow valleys. The hills are characterized by steep slopes, and along the Ohio they rise to altitudes of 600 and 800 ft. West Virginia has a greater average altitude than any other state east of the Mississippi.

RIVERS. The Potomac and its tributaries drain the eastern part of the state. The principal streams of the plateau region are the Great Kanawha, the Little Kanawha, the Guyandotte, the Monongahela, the New, the Cheat and the Greenbrier, which, however, has its source in the mountain valleys. The Tug Fork of the Big Sandy forms the boundary between this state and Kentucky. Only a few of these streams are suitable for navigation, but all of them are valuable as sources of water power.

CLIMATE. Owing to its varying altitudes, the state has a wide range of temperature. The climatic difference between its lowest and highest points is equivalent to a difference caused by 15° of latitude. The region east of the mountains is warmer and drier than that on the west. The mean temperature in the Panhandle is from 34° to 37° for winter, and 70° to 75° for summer. In the southern part of the state it is a few degrees higher, with a yearly mean of 54.4° for the entire state. The average

rainfall, including snow, is 44.2 inches. Snowfall in the valleys is light, but on the high mountains it may reach a depth of six or seven feet.

MINERALS AND MINING. West Virginia has over 17,000 sq. m. of bituminous coal measures, at least 12,000 sq. m. of which are known to be productive. The most valuable deposits occupy three distinct areas: the Pittsburgh coal region in the northwest, underlying 15 counties; the Allegheny-Kanawha region, extending across the central part of the state and underlying 17 counties; and the New River measures in the southwest and underlying 10 counties. Coal mining is one of the most important industries of West Virginia, and this state is second in the Union in the production of coal, being exceeded only by Pennsylvania.

Petroleum and natural gas are found in large quantities in the northwestern part of the state. The existence of oil in this region was known several years before wells were bored in Pennsylvania, but the breaking out of the Civil War prevented an early development. Much oil is piped to Pennsylvania and to the Atlantic seaboard, and much natural gas to near-by towns in Kentucky, Ohio and Pennsylvania.

Iron ore occurs, but it is not extensively mined. Salt is manufactured. Limestone and other building stones are quarried in paying quantities, and grindstones are quarried in Wood and Jackson counties. Slate occurs near Martinsburg, and sandstone, which, when crushed, furnishes excellent sand for the manufacture of glass, is found in Morgan County. Mineral springs possessing valuable medicinal properties are located in Greenbrier, Summers, Webster, Ohio and Preston counties.

FOREST AND LUMBER. There are extensive hardwood forests in the plateau region. Among the most important varieties of trees are black walnut, yellow poplar, red, white and chestnut oak, and cherry. On the higher altitudes and the mountains, hemlock, spruce and

white pine are found. The largest saw-mills in the world for the manufacture of hardwood lumber are located in Randolph, Pocahontas and McDowell counties. Lumbering is an important and rapidly increasing industry.

AGRICULTURE. Agriculture is the chief occupation of the inhabitants, and agriculturally the state may be divided into two regions, the eastern (or mountainous) region, devoted largely to stock raising, and the western (or plateau) region, devoted to tillage. Most of the farms are small and are worked by the proprietors.

Soil. The soil has been formed by the decomposition of the native rock, instead of being washed in by streams, and it is generally fertile. The upland valleys contain alluvial soil. Clay soils occur in some of the higher elevations, and in the northeast the soil is sandy.

Products. The leading cereal crops in the order of value are corn, wheat, buckwheat, rye and oats. Hay is an important crop, and tobacco is grown throughout the state. Apples, peaches, plums, cherries and small fruits are raised throughout the plateau region. Large shipments are made from eastern counties. Horses, cattle, sheep, hogs, poultry and mules are raised chiefly in the eastern and northern parts of the state.

MANUFACTURES. The manufacturing region is confined almost wholly to the northwestern part of the state. This is due largely to the presence of fuel and partly to the transportation facilities afforded by the Ohio River. Glass, iron and steel and their products constitute the most valuable manufactures. Next to these are lumber and timber, and third in order are flour and gristmill products. Tanning and finishing leather is an important industry in the north-central and eastern parts of the state, and is dependent largely upon the supply of hemlock and oak bark which can be procured in this region. Glass of excellent quality is manufactured in and about Wheeling. In the coal regions large quantities of

coke are made, West Virginia ranking next to Pennsylvania in the manufacture of this product.

TRANSPORTATION AND COMMERCE. The railway mileage of the state exceeds 3500. The main line of the Baltimore & Ohio crosses the state from east to west, and from this extend spurs in various directions. The Chesapeake & Ohio Railway traverses the southern part of the state. In the eastern part is the Western Maryland Railroad; the Norfolk & Western and the Virginian are in the south. Short lines extend to the coal fields and lumber regions wherever the production is of sufficient importance to warrant. Coal and coke are shipped from Elkins to Charleston. The Great Kanawha, Little Kanawha and Monongahela (to Fairmont) are navigable for barges and lumber rafts. The exports of the state are coal, coke, lumber, live stock and various farm products.

GOVERNMENT. The present constitution was adopted in 1872, and has been several times amended, the last in 1912, when state-wide prohibition was adopted. The executive department of the government consists of the governor, secretary of state, auditor, treasurer, attorney-general, superintendent of public instruction and commissioner of agriculture, all elected at the time of the presidential election and serving for a term of four years. The Legislature consists of a Senate and a House of Delegates, the former composed of 30 members, and the latter of 86 members. The Legislature meets in odd-numbered years, and the session is limited to 45 days, but may be extended by a two-thirds' vote of the two houses.

Among the administrative boards, that of first importance is the rotating board of control, created in 1909. It consists of three persons appointed by the governor for terms of six years. At its discretion and upon its approval the appropriations to state institutions (of education, charities and corrections) and to various boards and bureaus are expended.

The judicial power is vested in a Supreme Court of Appeals, Circuit Courts and such inferior courts as the Legislature may establish. County Courts exercise only probate powers. The Supreme Court of Appeals consists of five judges elected for 12 years. It holds three terms annually, at Wheeling, Charleston and Charles Town, respectively. The Circuit Court consists of 19 judges elected for eight years, and the state is divided into 18 circuits for judicial purposes. In some counties inferior courts have been established by the Legislature for the purpose of relieving the Circuit Courts. There are one or more justices of the peace in each magisterial district.

EDUCATION. In recent years the school system of the state has made rapid progress. Each magisterial district constitutes a school district. The schools of the state are under the general supervision of the superintendent of schools, and those of the county are under the supervision of the county superintendent. Children between 8 and 15 years of age are required to attend school 24 weeks each year, provided the public school in their district is in session that length of time. A state board of education, appointed by the superintendent of public instruction, is a board of examiners for granting certificates to teach. This board also prescribes a course of study for the public schools. There are also a state school-book board and a state board of regents for the state university and the normal schools. The West Virginia University at Morgantown is at the head of the school system of the state. There are normal schools for white students at Athens, Huntington, Fairmont, Glenville, Shepherdstown and West Liberty, and for colored students at Institute and Bluefield. Higher educational institutions not under control of the state are Bethany College at Bethany, Morris Harvey College at Barboursville, West Virginia Wesleyan College at Buckhannon, Davis and Elkins College at Elkins and Salem College at Salem.

STATE INSTITUTIONS. The hospitals for the insane are at Weston and Spencer. Miners' hospitals are maintained at Welch, McKendree and Fairmont, respectively. The asylum for incurables is at Huntington, and schools for the deaf, dumb and blind are at Romney. The penitentiary is at Moundsville, the boys' reform school is near Grafton and the girls' industrial school near Salem.

CITIES. The chief cities are Charleston, the capital; Wheeling, Huntington, Clarksburg, Parkersburg, and Fairmont.

HISTORY. Previous to 1861 West Virginia was a part of Virginia. When the latter state passed the ordinance of secession, the northwestern counties, a large majority of whose voters were opposed to that ordinance, called a convention for maintaining the state government. This resulted in a second convention, which organized the new state. The following year a constitution was adopted, and in 1863 West Virginia was made a member of the Union. During the Civil War portions of the state were overrun by both Confederate and Federal armies, and a guerrilla warfare was maintained in some sections. West Virginia furnished about 36,000 soldiers to the Federal armies and about 10,000 to the Confederate. After the readmission of Virginia into the Union in 1870, trouble arose between that state and West Virginia concerning the state debt, one-third of which the older state regarded as the share of the newer. The dispute affected politics for years and was finally carried to the United States Supreme Court. Since the close of the war the state has steadily progressed in industrial, social and educational lines.

GOVERNORS. Arthur I. Boreman, 1863-1869; D. D. T. Farnsworth, 1869; Wm. E. Stevenson, 1869-1871; John J. Jacobs, 1871-1877; Henry M. Mathews, 1877-1881; Jacob B. Jackson, 1881-1885; E. Willis Wilson, 1885-1890; A. Brooks Fleming, 1890-1893; Wm. A. MacCorkle, 1893-1897; George W. Atkinson, 1897-1901; Albert B. White, 1901-1905; Wm. M. O. Dawson, 1905-1909; Wm. E.

Glasscock, 1909-1913; H. D. Hatfield, 1913-17; J. J. Cornwell, 1917-21; E. F. Morgan, 1921-25; H. M. Gore, 1925—.

West Virginia University, at Morgantown (1868). Monongahela Academy, located at Morgantown in 1814 by the Legislature of Virginia, was a well-known institution for 50 years. Upon the founding of the West Virginia Agricultural College in 1867, the academy turned over its property to the college; one year later this became the state university. The institution has a picturesque campus of 50 acres and a farm of 200, its total assets amounting to about \$1,250,000. Its library contains about 92,000 volumes. There are affiliated colleges of medicine for men and women, at Baltimore, Md., and its college of veterinary science has a hospital and clinic at Pittsburgh, Pa. There are approximately 2800 students. A large number are enrolled in its summer courses.

Wetas' kiwin, Alta., an agricultural center, 157 miles north of Calgary and 43 miles south of Edmonton, on the Canadian Pacific Railway. It has fox farms, a flour mill, and is an important shipping point for poultry and hogs, wool, and lumber from mills situated west of the city. Natural gas from wells in the vicinity is used in the manufacture of power. Wetaskiwin was founded in 1891 with the coming of the railroad and was incorporated as a city in 1906. Fort Ethier, built at the time of the Riel Rebellion, is situated four miles north of the city. "Wetaskiwin" comes from Indian words meaning "Peace Hills," a name applied to hills west of the city. Population, 2051.

Weyburn, Sask., an agricultural center 85 miles southeast of Regina on the Souris River and on the Canadian National and Canadian Pacific railroads. It has bottling works and railroad shops, and is a distributing point for wheat and other farm products. The city is the seat of a collegiate institute and of a provincial mental hospital. It was incorporated in 1913. Population, 4300.

Weyler, Wa' ler, Y Nicolau Valeriano, MARQUIS OF TENERIFFE (1838—), a Spanish general whose governorship of Cuba was marked by great cruelty. He was born at Palma, on the Island of Majorca. During the Civil War he was military attaché of the Spanish legation in the United States. He held a command in the ten years' war in Cuba (1868-78) and served as governor of the Canaries, the Philippines, the Province of Catalonia, Cuba, and Madrid. His inhumanity during his governorship of Cuba aroused such protest from the United States that he was recalled in 1897, the year after his appointment.

Weymouth, Wa' muth, Mass., an industrial town of Norfolk County, 12 miles southeast of Boston, on Boston Harbor and on the New York, New Haven & Hartford Railroad. The leading industry is the manufacture of shoes, and other products include seam-faced granite, fireworks, isinglass, boxes, and art leather. There are also machine shops, wool-scouring plants, and a large power plant which furnishes electric current to places within a radius of 100 miles. The first permanent settlement was made in 1623 and called by the Indian name of Wessagusset. It was renamed and incorporated in 1635. Population, 17,800.

Whale, a family of large aquatic Mammals having fishlike bodies adapted to life in the water. In former geologic periods the whale's body may have more closely resembled those of other Mammals, but is now hairless and its forelimbs are finlike in form and function. The hind limbs are entirely lacking and are only indicated by the shape of the pelvis, which is broad and girdlelike. Like all Mammals, the whale is warm-blooded, and the high temperature of the body is maintained while the creature is in its cold surroundings, by means of a layer of fat known as the blubber, which lies under the skin and over the muscular flesh. From it the once valuable whale oil was extracted. Being a mammal, the whale breathes through lungs and not gills. The long head, some-

what out of proportion to the size of the body, has a huge mouth, no external ears and small eyes, which lie near the hinge of the mouth. The nostrils are upon the forehead and may be closed at will as the animal dives below the surface. The tail has the familiar flukes of the fish, but they are set horizontally.

The whalebone whales, of which the Greenland whale is a good representative, are without teeth when mature, although the young have a complete set. These whales are distinguished by the presence in the mouth of long, triangular, horny plates, which are an exaggerated form of the ridges upon the palates of all Mammals. These plates are attached to the palate by the broad end, and the lower surface is cut into a number of comblike teeth or threads, which act as a straining apparatus. The plates vary in length and in color and are still valued for stiffening in stays, fans and whips.

Whales are found in cold, open seas, where they swim about generally in great herds. Their capture, once an important industry, in the United States rose, waxed and waned within a single century. Probably the first whale fisheries were carried on by the Dutch, who valued the whale for its oil, but threw aside the whalebone as so much waste. At the time of the settlement of Plymouth, whales were common along the New England coasts, and whaling was from the first an important industry. Nantucket was the first important port of the fisheries and was greatly increased in importance by the early capture of sperm whales, which furnish sperm oil, once the most important and most valuable product of the whale. The whaling vessels were large, well-built boats and made up a fleet that was the pride of the colonies. The Revolutionary War was the first blow to the growth of the industry; the fisheries naturally first felt its effect and the destruction of the whaling industry seemed almost complete, since during the years of the war excellent substitutes took the place of sperm and whale oil.

However, the years between 1815 and 1860 were the most prosperous years for the whale fisheries. The value of whalebone was discovered, prices of sperm oil and whale oil increased and new ports of embarkation became important. Notable among these was New Bedford, Mass., which became the center of the greatest whale fisheries carried on from any region in the world. The Pacific was also found to be a rich field, and the opening of transcontinental railroads increased the ease of distribution of the products. With the panic of 1857, the outbreak of the Civil War, the improvement in manufactories in New England and the discovery of petroleum, the final downfall began. Where in 1846 there had been 736 ships engaged in whaling, in 1906 there were but 42, and at present there are but four ports from which whaling vessels leave. It is not probable that the whaling industry will ever be revived to any great extent in the United States. An occasional find of ambergris, which is literally worth its weight in gold, often inspires a dream of adventure that is easily dissipated when the perils of the voyage are known.

Ambergris is used in the manufacture of perfumes, sperm in the production of refined oils, and whale oil in the production of glue, fertilizers and heavy lubricating oils and in the strengthening of cordage. See WHALEBONE; AMBERGRIS.

Whale'bone', or **Baleen'**, a term applied to the horny plates which are attached to the palate of the whalebone whale and which hang down into the cavity of the mouth. There are about 200 plates on each side of the mouth, varying in length from a few inches to 12 ft., acting as a kind of sieve, or strainer, for the substances on which the whale feeds. Owing to its strength, lightness and flexibility, whalebone is used for many purposes, chiefly in the ribs of cheap umbrellas, whips, surgical instruments and corsets. See WHALE.

Wharton, *Hwaur'tun*, **Edith** (Jones) (1862-), an American novelist, born

in New York. She married Edward Wharton, of Boston, in 1885. Her novels are written in a finished style and deal to an extent with psychological analyses. They include *The Greater Inclination*, *The Touchstone*, *Crucial Instances*, *The Valley of Decision*, *Sanctuary*, *Italian Villas and Their Gardens*, *Italian Backgrounds*, *The House of Mirth*, *The Fruit of the Tree*, *The Hermit and the Wild Woman* and *The Age of Innocence*.

Wheat, an important food plant of the Grass Family. The plant has a slen-

range extending from semitropical to the extreme boundaries of the cool temperate regions, in America from Mexico to northern Canada and in Asia from India to Siberia. Certain regions, however, are more favorable than others to its production. Wheat thrives best in a temperate climate, where the rainfall is from 30 to 40 inches, and in a rich clay soil or a heavy loam. The rainfall should occur during the early part of the summer, when the crop is growing. Dry weather is desirable during the period of ripening.



der, hollow stem with a few long, narrow, pointed leaves. The seeds appear in a close four-rowed head or ear at the summit of the stem. When ripe, the plant is light yellow and the grain a reddish-brown. Its cultivation has been known for centuries, and in ancient times Egypt was the leading wheat-growing country. From the Valley of the Nile the grain found its way to Europe and soon became an important crop in nearly every country. It was introduced into America by the early colonists.

Wheat is adaptable to a wider range of climate than any other cereal, its

VARIETIES. The wide range of climatic conditions under which wheat is grown has led to the production of many varieties. These can all be brought, however, into two classes, bearded wheat and bald wheat, when structure alone is considered. The bearded wheat has long bards attached to the glumes that surround the kernel; in the bald varieties these are lacking. Again, all varieties of wheat belong to one of two classes, when we consider the time of planting. These are spring wheat and winter wheat. Spring wheat is planted in the spring and matures in a single

season. It is adapted to the short season of the northerly wheat-growing regions. The plants secure their growth before the extreme hot weather sets in and usually have a ripening period comparatively free from rain. Spring wheat produces a harder, richer kernel than the winter varieties and usually brings a higher price in the market.

Winter wheat is planted in the late summer or early autumn, so that the plants get a good start before frost. The crop matures early in the following summer. Winter wheat is suited to the warm wheat-growing regions. By planting in the fall it secures its growth in cool weather, and it ripens the next season before extreme hot weather begins. The kernel is not so hard nor so rich as that of spring varieties, but it nevertheless produces a good grade of flour. In regard to kernel, wheat is graded into dark-colored or red, and light-colored or white.

PRODUCTION. The United States and Russia are the leading countries in the production of wheat. Some seasons the United States leads and other seasons Russia has the larger crop. The countries are so nearly even that it is difficult to tell which leads. Other countries of the Old World are, in the order of importance, France, British India, Austria-Hungary, Italy, Spain and Germany, each of which produces over 100,000,000 bushels. In the New World, Canada and Argentina rank first and second, omitting the United States. Chile produces about 37,000,000 bushels and Australia about 150,000,000 bushels. The world's wheat crop average is about 4,000,000,000 bushels, nearly one-half of which is grown in European countries. Wheat growing in the North-west Provinces of Canada is developing rapidly, and in 1918 the crop exceeded 200,000,000 bushels. Because of the remarkable adaptability of this region to raising wheat, it has been happily termed "the bread basket of the world."

THE UNITED STATES. Raising wheat is one of the most important branches of

agriculture in the United States and, next to corn, wheat is the most valuable cereal crop. The leading wheat-growing states may be divided into two groups, the spring-wheat states and the winter-wheat states. The great spring-wheat region is in the Valley of the Red River of the North. It includes Minnesota, the Dakotas, and Iowa as far south as Des Moines. The winter-wheat states include Kansas, Nebraska, Oklahoma, Missouri, Illinois, Indiana, Ohio and the Pacific States—California, Oregon and Washington. In the order of production, the first ten states rank as follows: Kansas, N. Dakota, Minnesota, S. Dakota, and Illinois, Missouri, Indiana, Ohio, Nebraska and Oklahoma average from 100 to 300 million bushels each.

Cultivation. In the Wheat Belt of the United States and Canada the cultivation of wheat has reached the highest stage of perfection. As far as possible the ground is plowed in the fall, then disked, harrowed and seeded as early in the spring as the season will permit. All these operations are carried on by machinery, leaving to the farmer only the labor necessary to operate the machines. On the largest farms gang plows drawn by traction engines are used. The largest of these gangs turn 12 to 16 furrows at once and plow a large field in a day. The diskers and harrows may be operated in the same manner. The seed is placed in the ground by the seeder. This is operated by a team of two horses and will seed about ten acres a day. After planting, the crop requires no further attention until ready to harvest.

Harvesting. Harvesting is done by means of the harvester, a machine which cuts the grain, binds it into bundles and carries these bundles until enough to form a stook are collected, when it deposits them on the ground. One of these harvesters requires three or four horses for its successful operation, and it will cut about ten acres of wheat in a day. Here again the traction engine may be employed and a number of harvesters attached. In California and some other

regions, where the wheat becomes thoroughly dry on the stalk, a combined header and thrasher is used. This machine cuts just enough of the straw to secure all the heads, which it pours into the thrasher. The grain flows into sacks, which are sewed and dropped from the machine as fast as they are filled. One of these machines requires a team of 24 horses, or an engine of equal power for its successful operation.

In most localities the wheat remains in shock, or stook, until dry, when it is thrashed and stored in elevators. The thrashing machines are operated by steam or gasoline engines, and the largest will thrash over 4500 bushels a day under the best conditions. Smaller machines thrash from 1200 to 1500 bushels a day. The wheat may be sold at once and shipped to the great wheat centers, such as Minneapolis, Duluth, Chicago and Buffalo, where it is stored in large elevators until needed, or it may be stored in a local elevator and held for a higher price. See REAPING MACHINE; THRASHING MACHINE; GRAIN ELEVATOR.

PRODUCTS. Flour is the most important product derived from wheat. Local mills are scattered all through the wheat-growing regions and their combined output is large. Nevertheless the bulk of the flour is manufactured in the great milling centers like Minneapolis, which is the largest in the world (See FLOUR). Wheat flour is the most valuable article of food derived from any grain, and wheat is the staple food of civilized nations.

Besides flour, bran and middlings, or shorts, are obtained in milling wheat. These products are valuable for feeding stock. The straw is used for various purposes, such as litter for farm animals and the manufacture of cheap grades of wrapping paper and board for the manufacture of paper boxes. It is of little value for fodder.

PRESENT CONDITION. In no branch of agriculture has the invention and improvement of machinery shown more far-reaching results than in raising and mill-

ing wheat. Not only have these inventions reduced the cost of production, but they have also made possible the wheat loaf throughout the civilized world. "A modern farmer, with the practice of modern scientific knowledge and the use of modern machines, can, with three months' labor, raise as much wheat as could an old Roman had he worked ten hours a day, six days a week for all the weeks of his three score and ten years."

Because of these inventions wheat is now raised in larger quantities than would otherwise be possible; its culture has also been extended to regions which in recent times were considered worthless for agricultural purposes. The wheat harvest now extends around the world, and throughout the year there is not a day but in some locality is heard the click of the reaper. In 1906 and 1907 the director of the agricultural experiment station at Hafia, Palestine, discovered the original species, or wild wheat, from which the cultivated varieties have been developed and to which several of them bear close resemblance. From this wild wheat a variety has been developed which can be successfully grown in much drier regions than any variety previously produced. The perfection of this variety will extend the cultivation of wheat to many new regions.

See also p. 3596, Vol. 8.

Wheat Midge, a small insect of the Gall Gnat Family, which does great damage to the wheatfields. The adult is a small yellow insect which appears in the spring and lays its cluster of tiny pink eggs in the growing heads of wheat. The larvæ hatch about the time the heads begin to swell, and feed upon the juice of the kernels, thus causing them to shrivel. After two or three weeks these orange-colored "worms" burrow into the ground, spin cocoons and spend the winter there. There is but one generation during a season. Great vigilance is necessary to rid the fields of this pest. Deep plowing and immediate burning of the chaff are suggested precautions. See MIDGE.

Wheel and Axle, a simple machine consisting of an axle having a wheel revolving with it. It is a kind of continuous lever of the first class, where the radius of the wheel is the power arm and the radius of the axle is the weight arm. The windlass in an old-fashioned open well is a practical application of the wheel and axle. The law of equilibrium for the wheel and axle is: *The power is equal to the weight multiplied by the radius of the axle and divided by the radius of the wheel.* On account of friction, the power actually required is considerably greater than that calculated by this rule. The derrick is an adaptation of the compound wheel and axle. See LEVER.

Wheeler, Benjamin Ide (1854-1927), an American educator and university president, born at Randolph, Mass. He was educated at Colby Academy and Brown University, where he graduated in 1875. He subsequently spent four years in study at German universities and in Greece. After teaching in the Providence High School, and in both Brown and Harvard universities, he was made professor of philosophy at Cornell in 1886. He left Cornell in 1899 to become president of the University of California. In 1895-6 he occupied the chair of Greek literature in the American School of Classical Studies at Athens, and in 1909-10 held the Roosevelt professorship in the University of Berlin. In 1919 he became president emeritus and professor of comparative philology at California. He is joint author of *Introduction to the History of Language*, author of *The Greek Noun Accent*, *Life of Alexander the Great* and *Organization of Higher Education in the United States*. He was editor of the department of philology in *Johnson's Universal Cyclopædia* and in *Macmillan's Dictionary of Philosophy and Psychology*.

Wheeler, Joseph (1836-1906), an American soldier, born at Augusta, Ga., and educated at West Point. Assigned to the cavalry he served in New Mexico. At the outbreak of the Civil War

he joined the Confederate army, becoming conspicuous as a raider, and by rapid promotions advancing to lieutenant-general. He rendered his most signal services at Shiloh, at Chickamauga and in harassing Sherman on his march through Georgia and South Carolina. Following the war, Wheeler engaged in law practice in Alabama and was a Democratic representative in Congress from 1880 till 1898, when he reentered the army, as major-general of volunteers, and was given command of the cavalry division of the Army of Santiago. He took part in the battles of Las Guasimas and San Juan Hill, and was senior member of the commission negotiating the surrender of the Spanish army and of Santiago. In 1899 he served in the Philippines, and in 1900 he was appointed brigadier-general and was retired under the age limit.

Wheeling, W. Va., a shipping and industrial center, the largest city in the state, and the county seat of Ohio County, 64 miles southwest of Pittsburgh, Pa., on the Ohio River and on the Baltimore & Ohio, the Pennsylvania, and the Wheeling & Lake Erie railroads. It has a municipal airport. It lies at the foot of high hills and is built partly on an island in the river. Wheeling is an important wholesale and jobbing center and is known especially for its iron and steel interests. There are large coal mines in the vicinity. Among the manufactures are iron and steel products, tinplate, airplanes, medicines, hand stogies and other tobacco products, china and porcelain, aluminum and glasswares, calico, machine-shop products, clothing, chemicals, packed meat, matches, flour, leather, etc.

The city has a number of attractive parks and playgrounds and five community centers that are operated during the winter. The market-auditorium has a market on the first floor and an auditorium seating 3,000 on the second floor. Among the leading educational institutions are the Linsly Institute (non-sectarian, boys) and Mount de Chantal Academy (Roman Catholic, girls). Wheeling is the most important city on the

WHELK

Ohio between Pittsburgh and Cincinnati. It was here that the convention which restored what is now West Virginia to the Union was held, and here that the constitution of West Virginia was framed and adopted. The first settlement was made by Ebenezer Zane in 1770. It was incorporated as a town in 1806 and chartered as a city in 1836. It was the capital of the state from 1863 to 1869 and from 1875 to 1885. Population, 70,000.

Whelk, a European Mollusk of the Murex Family, once used in the production of red and purple dyes. The shell is spiral and marked with fine lines running in both directions, but there are seldom any spines. The whelk has a long proboscis which it can protrude and with which it can make an opening into the shells of smaller Mollusks; through this opening it sucks the soft body of its victim. Whelks are a pleasing food in many European seaport towns and are also used as fish bait.

Whig, the name of a political party in England which was opposed to the royal prerogative or authority exercised by the king. Opposed to the Whigs were the Tories, who favored the extension of royal authority. The Whigs reached the height of their power just before the Revolutionary War in America; they favored the cause of the colonies, and for this reason the Americans who were opposed to the home government took for a time the name of American Whigs. The name is also applied to a party which arose in the United States in opposition to President Jackson. See **POLITICAL PARTIES IN THE UNITED STATES**, subhead *Whig Party*.

Whippoorwill", a bird of the Goatsucker Family. The whippoorwill is about as large as the robin; the upper parts are mottled gray, streaked and barred with black; the under parts are blackish; the throat is black with a white border; the wings are marked with reddish-brown; and the three outer tail feathers are white for about a third of their length. The bill is small and the gape of the mouth is very wide. The

WHIRLWIND

feet are weak, for which reason the bird perches lengthwise of a limb. The nest consists of a few leaves in a secluded woodland spot. Two white eggs blotched with brownish or purple are laid. The peculiar song begins at dusk and is heard with more or less regularity all night. The whippoorwill is common in summer in eastern North America and winters from the Gulf States to Central America.



WHIPPOORWILL

Whirl'pool", a circular current or eddy in a body of water, caused by the shape of the channel, the meeting of currents and winds meeting tides. Small whirlpools occur in rivers and are usually caused by forcing the current into a circular space in the channel, or by the shape of the bank. One of the most noted river whirlpools in the world is that in the Niagara River about three miles below the Falls. Sometimes the position of rocks and the direction of currents in the sea produce whirlpools that at times are dangerous to navigation. Such are the Charybdis between Sicily and Italy, and the Maelstrom off the coast of Norway.

Whirl'wind", an eddy of air formed by conflicting currents in the atmosphere. When a current of air is moving steadily along and meets or passes another

current flowing in the opposite direction, an eddy is formed at the point of contact and the direction of the whirl will be determined by the stronger current. Such winds vary in magnitude from the small dust whirls seen in the streets to the violent disturbances known as tornadoes. In sandy desert regions dust whirls of considerable magnitude and destructiveness often occur. When the air is too dry to permit the formation of a cloud of vapor, the quantity of dust particles carried inward and upward is often sufficient to form a dust cloud at the center of the whirl. See STORM; TORNADO; CYCLONE.

Whis'key, an alcoholic beverage made by distilling from malt or grains, such as wheat, rye, corn, or other substances containing starch. Both Irish and Scotch whiskey are made from malt, while a large number of distillers in the United States used only from five to ten per cent of malt. Wheat, corn, rye, potatoes or any starchy material is boiled until it forms a mash, when malt is added to convert the starch into sugar. Yeast is next introduced to induce fermentation. Up to this point the process is quite similar to the brewing of beer, but in making whiskey the process of fermentation is continued until all the available sugar is changed into alcohol. The next step is to separate this alcoholic mixture by distilling; therefore, it is heated in a boiler, and its vapor is led through a pipe coiled in cold water, when the vapor condenses and is conducted or caught in a tank.

Bourbon whiskey is made principally from corn and malt and takes its name from Bourbon County, Ky., while rye whiskey is made chiefly of rye and malt. The so-called moonshine whiskey is made contrary to law and is obtained almost entirely by distilling the mash made of corn. Whiskey, when new, is colorless. The color is usually obtained from the oak barrel in which it is stored, or is given to it by other artificial means. Whiskey paid a tax to the government, and when not immediately sold was stored in bonded warehouses, when the payment

may be deferred until the time of sale. See ALCOHOL; BEER; DISTILLATION; BREWING.

Whiskey In'surrec'tion, a revolt against the Federal Government in western Pennsylvania in 1794. It was caused by the passing of a law by Congress, 1791, whereby an excise tax of from 7 to 18 cents was put on each gallon of whiskey. This tax bore heavily upon the trans-Allegheny people, most of whom were dependent upon their distilleries for support. They denounced the law, resisted all government attempts to collect the excise and refused the offer of amnesty in return for submission. In October, 1794, Pennsylvania, New Jersey, Maryland and Virginia furnished President Washington with 15,000 militia. The insurrection ceased at once before this force. All those convicted for offense in connection with the uprising were later pardoned by Washington.

Whiskey Ring, the name given a combination of United States revenue collectors and distillers who planned to defraud the government of the excise tax on whiskey. The "ring" began operation in St. Louis. While the decrease in revenue was at once noticed, it was some time before it could be traced, because some of those directly interested were in the treasury department at Washington. Finally, in 1875, Benjamin H. Bristow, secretary of the treasury, obtained sufficient evidence to warrant prosecuting the offenders, among whom were the chief clerk of the treasury and O. E. Babcock, President Grant's private secretary. Neither of them was convicted, but about 240 distillers were convicted in open court or pleaded guilty. The loss to the government amounted to over \$1,650,000 in ten months.

Whis'pering Gallery, a place so constructed that whispers from certain points are plainly heard at another point at a great distance away. This phenomenon occurs most frequently in buildings having curved walls or domes. Sound waves set in motion from a cer-

tain point near one surface of the curved wall are reflected from this wall to the opposite curve, from which they are again reflected and caught at a point having the same relative position to the second wall. Feeble sounds made at the first point are easily heard at the second, though not heard at intermediate points. Such galleries are often shown as curiosities, but auditoriums where this phenomenon is noticed are thereby often rendered unfit for use. Probably the most famous whispering gallery is that of the dome of St. Paul's, London.

Whist, a game of cards. It was first mentioned by John Taylor, an English pamphleteer, in 1621, and afterwards described clearly by Edmond Hoyle in his *Short Treatise on the Game of Whist* (1742). A full pack of 52 cards is used, and the game is played by four persons, two being partners who play against the other two partners, each player receiving 13 cards, which are dealt out one at a time in rotation. The last card dealt belongs to the dealer and is called a trump card. It denotes what suit is to be trump, unless this has been arranged by agreement beforehand, when the last card is not considered. The values of the cards are as follows: ace (highest), king, queen, knave, 10, the others ranking in value according to their number of spots, the 2 being the lowest.

The play begins when the person on the left hand of the dealer lays a card face-up on the table; the other players follow in succession, each one following suit, that is, playing a card of the same suit, if they have it. If they are unable to follow suit, they have the privilege of trumping or of discarding a card of any other suit. The winning of the trick is by reason of playing the highest card or by trumping, and it secures the right to lead, which is often quite important. After the hand is played out, the score is made as follows: the partners who conjointly secure the majority of tricks score one point for each trick over six; six tricks are collectively called a book. A game may be five points or ten points as agreed. The counting

of honors is now practiced only in bridge.

DUPLICATE WHIST. Duplicate whist is played the same way as above, except that the cards are not mixed up in playing, but each hand is kept separate by each player's laying before him in a pile each card as it is played. These are usually put into a tray or case on a board with the four hands in such a defined position that when the hands are to be played over again, the board is turned to the left in order that the hands may be all changed in their distribution, and hands originally held by A and B are now held and played by their opponents. This eliminates so-called luck, and winning is really a test of skill.

AUCTION BRIDGE. From the game of whist grew another game called bridge or bridge whist, and from the latter developed a third game called *auction bridge*. This is the game in vogue today and is the subject of this section. As in whist, 13 cards are dealt to each of four players; when a card is led each of the other players must follow suit, or a player lacking a card of the suit led may trump or discard a card of another suit.

In auction bridge, the right to select the trump goes to the player who makes the highest bid. In making the trump the players bid in turn, starting with the dealer. The bidding continues until three players have "passed." If a player expects to take 7 tricks in a suit he bids 1 (meaning 1 over 6); if 8 tricks, he bids 2; etc. The value of the suits is as follows: clubs, 6; diamonds, 7; hearts, 8; spades, 9; and no trump, 10.

The player who contracts to take the greatest number of tricks of the highest value plays the hand. The player who first bids the suit secures the bid and plays the hand even though his partner has made the highest bid in that suit. The person who secures the bid is called the declarant. His partner becomes the *dummy* and lays his cards face up on the table to be played by the bidder. The player to the left of the declarant starts the play. After he has led, the dummy's hand is laid down.

Scoring. The score is kept in two

parts, the *game* score and the *honor* score, which are added together at the end of the play. The tricks count as follows: If declarant makes his contract, each trick over 6 which he takes counts 6 if clubs are trumps; if diamonds, 7; if hearts, 8; if spades, 9; if no trump, 10.

The declarant, if he takes more tricks than he has contracted to take, scores for all he makes; if he fails to fulfill his contract the opposing side scores 50 in the honor score for each trick which the declarant loses, or 100 if it has doubled the bid. If the declarant wins after a double he scores 50 in the honor column for fulfilling his contract and 50 for each trick over the number which he has contracted to take, or 100 in each case if he has redoubled. In addition, he scores double the amount of his tricks in his trick score. A game counts 30 points in the trick score. A rubber is won by the side which first wins two games, whereupon a bonus of 250 is added to that side's honor score.

In each suit there are five honors—ace, king, queen, jack, ten—which count in the score of the side holding three or more of the five. If no trump is being played the four aces are the honors. If each side holds two of them the honors are said to be *divided* or *easy*, and do not count. Otherwise aces and trump honors are scored as shown in the following table:

TRUMP HONORS

0 in one hand, 3 in partner's—count	30
1 in one hand, 2 in partner's—count	30
1 in one hand, 3 in partner's—count	40
2 in one hand, 2 in partner's—count	40
2 in one hand, 3 in partner's—count	50
0 in one hand, 4 in partner's—count	80
1 in one hand, 4 in partner's—count	90
0 in one hand, 5 in partner's—count	100

NO TRUMP HONORS

0 in one hand, 3 in partner's—count	30
1 in one hand, 2 in partner's—count	30
1 in one hand, 3 in partner's—count	40
2 in one hand, 2 in partner's—count	40
0 in one hand, 4 in partner's—count	100

Slam points, which are added to the honor score, are for *grand slams* or *small slams*. A side makes a grand slam when it wins 13 tricks. This counts 100. Either side winning 12 tricks makes a small slam, which counts 50 points. When

the declarer contracts for 7 tricks and wins 6-odd (meaning 6 over his book of 6 tricks), he counts 50 for a small slam although his contract fails.

At the end of the rubber, the total made by each side is found by adding its trick score and its honor score. The winner of the rubber is the side which has the highest total discovered in this fashion, and the margin of victory is determined by subtracting the smaller total from the greater.

It is allowable to correct any error in the honor score at any time before the score of the rubber has been made up and agreed upon. An error in the trick score may be corrected only before the next auction begins, unless the error occurred in the final hand of the rubber, in which case it may be corrected according to rules for correcting the honor score. A proved error in subtraction or addition may be corrected whenever it is found.

Whistler, *Hwis'ler*, James Abbott McNeill (1834-1903), the most original and gifted artist America has produced. He was born at Lowell, Mass., the son of a distinguished engineer. In 1856, after a poor record at West Point Military Academy, he entered the studio of Gleyre, in Paris. His ideas of art were strongly influenced by the works of Velásquez and of the Japanese artists Hiroshige and Hokusai. The etchings entitled *Little French Series* established his reputation, and the later *Thames Series* placed him among the greatest artists of the time, if not of all time. His versatile genius found vent in a wide range of subjects, portraits, landscapes, still life, the sea, common life and interior decoration, which he treated in several mediums, oil and water color, pastel and with the etcher's needle. As an etcher he was a supreme master, taking rank with Rembrandt; and in some of the subtleties of his art he surpasses even that great artist. Among the best of his etchings are the numerous night scenes which he called nocturnes: *Falling Rocks*; *St. Mark's, Venice*; *Battersea Beach*; and *The Ocean*. The greatest of his portraits are *Thomas Carlyle* and that of his own mother, both enduring masterpieces. Whistler was a brilliant wit and satirist, and in his later life, turned to literature for the dissemination of his theories and the humiliation of his

enemies, whose name was legion. *Ten o'Clock, The Gentle Art of Making Enemies and The Baronet and the Butterfly* are among his published writings.

White, Andrew Dickson (1832-1918), an American educator, diplomat and author, born at Homer, N. Y. After graduating at Yale in 1853, he spent four years in Europe and five as professor of history in the University of Michigan. As a state senator from the Syracuse district of New York, he rendered exceptional service to the cause of education, which resulted in his election as the first president of Cornell University. During a brilliant career of 18 years in this position, President White continued to be active in public affairs, serving the nation in 1871 on Santo Domingan matters, in 1878 as honorary commissioner to the Paris Exposition, and from 1879 to 1881, with leave of absence from the university, as minister to Germany. He was minister to Russia in 1892-94, ambassador to Germany from 1897 to 1902, and in 1899 president of the American delegation to The Hague Peace Conference. His works include numerous important short articles and *Studies in General History, European Schools of History, Paper Money Inflation in France, Democracy and Education, Chapters from My Diplomatic Life, History of the Warfare of Science Against Theology* and an *Autobiography*.

White, Edward Douglass (1845-1921), an American jurist, born in Louisiana. He was a student at Mount St. Mary's College, Emmitsburg, Maryland, and at the Jesuit College in New Orleans. In the Civil War he served in the Confederate army. At its close he studied law, practiced for several years and in 1874 was elected state senator. In 1878 he became judge of the Supreme Court of Louisiana, and in 1891 was elected to the United States Senate. Three years later President Cleveland appointed him associate justice of the United States Supreme Court, of which he became chief justice in 1910 by President Taft's appointment. He was a Democrat in politics.

White, Richard Grant (1821-1885), an American Shakespearean scholar, essayist and philologist, born in New York City. He studied medicine, then law, became a journalist and was for a time a member of the staff of the *New York World*, and was editor of the *New York Courier and Enquirer* in 1854-59. From 1861 to 1878 he was chief of the United States Revenue Marine Bureau in the District of New York. He wrote a series of essays for the *London Spectator*, signed "A Yankee," which influenced public opinion in favor of the cause of the North during the time of the Civil War. His satirical parody *The New Gospel of Peace* attacked the advocates of "peace at any price." His musical and Shakespearean criticism was acute, though dogmatic. Among his books are *Shakespeare's Scholar*, a critical edition of Shakespeare's works, *Essay on the Authorship of the Three Parts of Henry VI, Memoirs of William Shakespeare, Studies in Shakespeare, Words and Their Uses, Every-Day English, England Without and Within and The Fate of Mansfield Humphreys*. He also edited *The Riverside Shakespeare*.

White, Stewart Edward (1873-), an American novelist, born at Grand Rapids, Mich. He studied at the University of Michigan, graduating there in 1895, and at the Columbia Law School. The scenes of many of his writings reflect the background of the Michigan forests, where he spent his boyhood days. He wrote *The Westerners, The Claim Jumpers, The Blazed Trail, Conjuror's House, The Forest, The Mountains, The Silent Places, The Pass, The Mystery, Arizona Nights, Camp and Trail, The Riverman* and *The Rules of the Game*.

White, William Allen (1868-), an American journalist, born in Emporia, Kans. He studied at the University of Kansas, and in 1890 became city editor of the *Eldorado Daily Republican*. After serving as editorial writer for the *Kansas City Journal* and *Kansas City Star*, he became, in 1894, editor and proprietor of the *Emporia Gazette*. Two years

later appeared the editorial, "What's the Matter with Kansas?" which was widely reprinted and caused him to become well known throughout the country. He joined the staff of the *American Magazine* in 1906 and has lately contributed timely articles to various periodicals. His works include *The Real Issue and Other Stories*, *The Court of Boyville*, *Stratagems and Spoils*, *In Our Town* and *A Certain Rich Man*.

White'caps', a name applied to groups of men in the United States, spontaneously formed, who attempt to punish men because of offenses against individuals or communities. Their complaint is that the usual course of legal administration is too slow or that sufficient punishment has not been meted out. Their methods are intimidation by threats, or violence. The usual disguise, the large white cap, gave rise to the name.

Whitefield, Hwit' feeld, George (1714-1770), an English evangelist, the founder of the Calvinist Methodists. He was born in Gloucester and educated at Oxford, graduating in 1736. At Oxford he was associated with the Wesleys in the organization of the "Holy Club" (See WESLEY, JOHN; WESLEY, CHARLES). After a missionary journey to Georgia he began open-air preaching in various places of England, attracting great crowds and winning many converts. In 1739 he again visited America, preaching, among other places, in Philadelphia, where he was heard by Benjamin Franklin, as a passage in the latter's *Autobiography* relates. He later made other trips to America, besides engaging in preaching tours in the Bermudas, Ireland, Scotland and Wales, delivering in all over 18,000 sermons. He was a friend of John Wesley, but the two could not work together because of difference in doctrine. Whitefield was a rigid Calvinist. He lacked the organizing ability of Wesley, hence left no strong Church as a witness of his labors, while many of his converts united with the Wesleys. Nevertheless, Whitefield was an influential factor in the religious revival that stirred England in the 18th century.

White'fish', a fresh-water food fish of the Salmon Family. All are plump, graceful fish, with tapering bodies, pointed heads and forked tails. There are many species, the best known of which is called the common whitefish; this may be recognized by the fleshy hump upon its shoulders. The whitefish spawns upon rocky coasts of the Great Lakes and is considered one of the best food fish taken there. The flesh is white and sweet, and the size is sufficient to make its capture profitable. The lake whitefish has larger mouth and scales than the preceding, and it attains a greater length, generally from one to three feet. This species is found in all clear lakes of northern North America, where the fish enter the streams only to spawn. Occasionally they even descend to the sea, but since they cannot endure warm or impure water they are seldom found south of the Great Lakes region. Other species are the Rocky Mountain whitefish, found only in the West; and the Soo whitefish, which is found in large quantities in the St. Mary's River during the spawning season.

White-Footed Mouse. See DEER MOUSE.

White House, The, in Washington, D. C., the residence of the president of the United States, also called the Executive Mansion. It is located on Pennsylvania Avenue, not far distant from the Treasury and the State, War and Navy buildings. It is built of sandstone, is two stories high and has a colonnade of eight Ionic columns in front. In the rear is a semicircular portico. The building derives its name from the fact that the exterior is painted white. It was begun in 1792 and was first occupied in 1800 by President Adams, who there held the first New Year's reception the following year. In 1814 the British army burned it, and it was partly rebuilt four years later. The present structure was completed in 1829. Recently extensive modifications have been made, but the building is practically in keeping with the original plans of its

architect. Though the White House fronts on the Potomac, its entrance on Pennsylvania Avenue is the one commonly used. It has spacious reception rooms, a dining room, conservatory, offices and apartments at the disposal of the president, his family and guests. The great East Room occupies one end of the building. It is 80 ft. long by 40 ft. wide, with a ceiling 22 ft. high, and its walls are adorned with life-sized portraits of George and Martha Washington. Adjacent is the suite of parlors known as the Green, Blue and Red rooms.

White Lead, *Led*, a compound known to chemists as basic carbonate of lead and used extensively in the manufacture of paint. It is generally prepared by rolling up thin sheets of lead and putting them into earthenware receptacles in which there is a weak solution of acetic acid or vinegar. These vessels are surrounded with spent tan-bark which ferments readily, producing heat and carbon dioxide. After being left for about 40 days, the lead is found to be either thickly coated with, or entirely changed to, a mass of white basic carbonate of lead. This is the oldest process and gives the best material; however, there are some quick chemical processes which produce white lead more cheaply. The white lead factories of the United States use lead obtained from the Rocky Mountains. See PAINT.

White Mountains, a group of mountains forming a part of the Appalachian system and situated in the north-central part of New Hampshire. They cover an area of 1200 to 1300 sq. m. and extend from the Connecticut River eastward to the boundary of Maine. The general trend of the group is from northeast to southwest. The mountains rise from a plateau having an elevation of 1200 to 1300 ft. and the highest summits range from 4000 to 6293 ft. The mountains are divided into two groups known as the Presidential Range, or White Mountains proper, and the Franconia Mountains. These ranges are separated by a table-land varying in width

from 10 to 20 m. The Presidential Range contains the most prominent peaks. Mt. Washington, the highest summit, has an altitude of 6286 ft., and next to Mt. Mitchell is the highest in the Appalachian system. Other prominent peaks of this range are Adams, Jefferson, Clay, Monroe and Madison, all over 5000 ft. The lower slopes of the White Mountains are heavily forested, but the summits are bare. They are formed of a variety of mica schist, containing large crystals of mica, which so reflect the sun's rays as to give the mountains the appearance of being covered with snow. Hence their name, White Mountains, or White Hills. The mountains are traversed by narrow cross valleys called notches. The most famous of these is Crawford Notch, with walls 2000 ft. high, and through which the Saco flows towards the sea.

The Franconia Mountains do not present so bold an appearance as the White Mountains, but they are nevertheless equally attractive. Mt. Lafayette, the highest peak, has an altitude of 5270 ft. The Franconia Notch is a narrow defile through which the Pemigewasset River flows. Projecting from a nearly vertical cliff on Profile Mountain is the "Old Man of the Mountain," a remarkable representation of the human face. It is formed by three rocks, the first forming the forehead, the second the nose and the third the chin. The profile is 90 ft. in length and about 1500 ft. above the observer. This is one of the most remarkable natural curiosities in the world. It is supposed that from it Hawthorne derived the inspiration for his allegory *The Great Stone Face*. Both the White and Franconia groups are noted summer resorts.

White Nile. See NILE.

White Plains, N. Y., a strictly residential city and the county seat of Westchester County, 20 miles northeast of New York City, on the New York Central and the New York, Westchester & Boston railroads. It is the seat of Good Counsel College, for girls, and of Collegiate Center, a New York Univer-

sity extension. An attractive feature of the city is Westchester County Community Center, which accommodates 7,000 persons. White Plains was settled in 1695. The first state constitution of New York was signed here on July 9, 1776. During the Revolutionary War it was the scene of the Battle of White Plains and of many skirmishes. It was incorporated as a city in 1916. Population, 28,700.

White Plains, Battle of, an engagement of the Revolutionary War, fought Oct. 28, 1776, at White Plains, near New York City, where Washington moved his base after the evacuation of Long Island. The conflict was brief and indecisive, Howe, the British commander, storming an outpost at Chatterton Hill. The British lost 229 men and the Americans lost 140.

White Sea, an arm of the Arctic Ocean, extending into northern Russia. It contains the Kandalak, Onega and Dvina bays and receives the waters of the Dvina, Onega and Mezen rivers. Archangel is the principal port. It is icebound from September to June, but in spite of that and its heavy fogs, navigation is considerable.

White Vitriol, *Vit' riol*, or **Sulphate, Sul' fate, of Zinc**. See VITRIOL; ZINC.

Whit' man, Walt (1819-1892), an American poet, born at Westhills, Long Island. His career was that of a self-made man, and he rose from errand boy to a country school teacher. After working on the staff of several papers, he spent his time between carpentering, driving an omnibus, serving as political stump speaker and writing poetry. His first volume of *Leaves of Grass* appeared in 1855, and was indifferently received, until Emerson's enthusiastic praise of it turned the current of criticism. He served as army nurse in the Civil War, and was clerk in the treasury department at Washington from 1865 to 1873. Retiring to Camden, N. J., he lived there until his death. He associated constantly with the common people, and his were the songs of democracy, pure and simple. At times he ran to extremes in

his efforts to rid himself of conventions, sacrificing form, overemphasizing frankness, his eccentricity seeming here and now a pose, but his poetry reflects so fully the joy of a simple, healthy, large and exuberant life that it will find readers as long as men delight in the ideal of a universal brotherhood of all. In spite of his democracy, however, he does not appeal to the masses. Aside from the several collections of the *Leaves* he wrote *Drum Taps*, *Democratic Vistas*, *Two Rivulets*, *November Boughs* and *Goodby My Fancy*. The death of Lincoln inspired one of his noblest efforts, the poem *My Captain*.

Whitney, Mount, the loftiest mountain in the United States outside of Alaska. It lies in the Sierra Nevada range in southeastern California; its snow-capped summit towers 14,502 feet above sea-level. Its abrupt eastern slope rises nearly 11,000 feet above Owens Valley. A curious fact is that Death Valley, the lowest depression in North America, lies less than 100 miles distant. The mountain was named in honor of Josiah Dwight Whitney (1819-96), an American geologist.

Whitney, Eli (1765-1825), an American inventor, born in Westborough, Mass., and educated at Yale College. He began his career as a teacher in Georgia, but later studied law. Meanwhile he became interested in separating the cottonseed from the fiber, a task so burdensome that it was a great barrier to raising cotton in the South. Encouraged by the widow of Gen. Nathanael Greene, at whose home he was living, Whitney, with rude plantation tools, invented the saw gin, which, with various improvements, is the cotton gin used on American plantations today. Whitney's model was stolen and his application for a patent was strongly protested, though a patent was finally granted him. He was paid \$50,000 by South Carolina and was granted a royalty by North Carolina for the use of his machines. But this and more he lost in law suits against infringements on his patent. Later Whitney engaged in the manufacture of fire-

arms for the government and amassed a fortune. See COTTON GIN.

Whitney, William Dwight (1827-1894), an American scholar and philologist, born at Northampton, Mass. He graduated at Williams College in 1845; studied at Yale for one year, and, during the succeeding year, at the universities of Berlin and Tübingen. From 1854 until his death he was professor of comparative philology at Yale. He was corresponding secretary and president of the American Oriental Society, and was the first president of the American Philological Association. His works include English, French, German and Sanskrit grammars, and *Language and the Study of Language* and *The Life and Growth of Language*.

Whit'sunday. See PENTECOST.

Whit'tier, John Greenleaf (1807-1892), a foremost American poet, was born on a farm in the Merrimac Valley, near Haverhill, Mass. Unlike Emerson, Lowell, Holmes and Longfellow, he came of a race of tillers of the soil, who for several generations were Quakers. Reared in the religious faith of his forefathers, and sharing in the hard work and privations common to the New England farm of a century ago, Whit'tier's boyhood was a natural preparation for his work as "a poet of the people." Such poems as *Snow-Bound* and *The Barefoot Boy* give us some interesting pictures of those early days. His first schooling was limited to the winter sessions of a neighboring district school; his reading, to a small family library and to what books he could borrow. When he was 14 he obtained a copy of Burns's poems, which he read with keen delight, and their author became his literary master.

EARLY LITERARY VENTURES. Whit'tier was fond of rhyming from the time he could write, especially so after he came under the influence of Burns, but his parents discouraged this poetic tendency, for they were too poor to give him the education they considered a necessary foundation for literary work. It happened, however, that his sister

Mary sent one of his poems, written when he was 17, to the Newburyport *Free Press*, then edited by William Lloyd Garrison. So impressed was Garrison by the young poet's talent that he made a personal call at the Whittier homestead, which was the beginning of a life-long friendship between the gifted journalist and the Quaker poet. Garrison urged that the boy be sent to school, and somewhat later the editor of the *Haverhill Gazette* made a similar plea for him. Whittier, having won his father's consent, earned a little extra money by making slippers and by teaching, which enabled him to enjoy two terms (1827-28) at the Haverhill Academy. This completed his schooling.

Meantime Garrison had not forgotten his young friend, and, soon after leaving the academy, Whittier secured, through his influence, the editorship of a Boston weekly, *The American Manufacturer*, at a salary of nine dollars a week. Called back to Haverhill by his father's illness, he remained there until the death of the elder Whittier in 1830, meantime editing the *Haverhill Gazette* and contributing various poems and articles to the *New England Review* of Hartford, Conn. The editorship of this Connecticut paper was transferred to Whittier in the absence of the regular editor (1830-32), and during this period he published his first volume, *Legends of New England* (1831). In the same year he published in the *Haverhill Gazette* a poem to William Lloyd Garrison. This was the beginning of his work in connection with the anti-slavery agitation, in which he showed that beneath a shy, Quaker exterior there burned the same fiery zeal that animated his friend Garrison.

LIFE AT AMESBURY. Whittier gave up his work in Hartford in 1832, because of ill health, and the next few years found him a zealous member of the anti-slavery ranks. In 1833 he issued an anti-slavery pamphlet, in 1835 served in the Massachusetts Legislature and the following year became secretary of the Anti-Slavery Society. While

editing the *Pennsylvania Freeman* (1838-40) in Philadelphia, his office was sacked and burned. The year 1840 he went to Amesbury, whither the family had removed in 1836, when the Haverhill property was sold. Amesbury was the home of the poet for the next 52 years, and here he wrote his fiery lyrics for the cause of freedom, and the bulk of the poetry by which he is best known. He was never married.

During the years at Amesbury, Whittier was a corresponding editor of the *National Era*, the Washington paper that first printed *Uncle Tom's Cabin*, and when the *Atlantic Monthly* was founded (1857) he was invited, with such men as Lowell, Longfellow, Holmes, Emerson and Prescott, to contribute to its columns. These notables used to come together each month for the "Atlantic Club" dinners, where Whittier was the quietest of the company. The many literary friendships he formed were among the bright spots in a life that a natural shyness and continued ill health made secluded. His mother died in 1858, and in 1864 he lost his sister Elizabeth, whose close sympathy with his hopes and ideals had made her a loving companion. In the loneliness that followed her death he wrote his greatest poem, *Snow-Bound* (1866), which pictures with the simplicity and charm of Burns's *The Cotter's Saturday Night*, the family life in the old homestead at Haverhill.

PERSONAL QUALITIES. The bodily suffering with which Whittier struggled for so many years left no mark on his kindly nature, and his last poems are as serene as his outward life. He was buried in Amesbury, and the funeral services, held in the open air, were conducted with the simple rites of the Society of Friends, whose speech and garb he had used all his life. Whittier was a man of earnest convictions and unflinching loyalty to principle, but he was moderate and just as a reformer; tolerant and free from prejudice in his religious beliefs. A quiet humor and excellent common sense saved him from the mistakes

that many zealous reformers make. In the stirring times before the Civil War his attitude toward those with whom he differed was wholly generous and fair-minded, and his nature grew more gentle and charitable with the passing years.

LITERARY QUALITIES. Whittier's poetry has the characteristics of the man himself, fervor, sincerity and simplicity. He was preeminently a poet of familiar things, and no other American writer has pictured with such fidelity and charm the scenes of rural life. *Snow-Bound* and such shorter lyrics as *Telling the Bees*, *Maud Muller*, *In School Days* and *The Barefoot Boy* have the touch that makes Whittier quite different from our other nature poets. He does not possess Bryant's breadth of tone, Emerson's insight, or Longfellow's graceful manner, but in his rural poems he writes, not for the people of the vales, but as one of them. He describes natural beauties not as one who has learned to love them through observation, but as one who belongs with the trees and flowers to the soil. This same natural, human touch appears in his poems of the sea. Again in ballad writing, Whittier has no equal among American poets; such poems as *Cassandra Southwick*, *Barbara Frietchie* and *Skipper Ireson's Ride* have the old-time spirit and rugged power that give them a permanent place in ballad literature. The faults that critics see in Whittier's poetry, bad rhymes and lack of finish, are defects in execution that seem counterbalanced by the unwavering earnestness of the writer. To the people he is the poet who has sung most truly the beauties of the home and of the scenes that lie close to the heart—the poet of their "altars and their fires."

"Best loved and saintliest of our singing
train,
Earth's noblest tributes to thy name be-
long.
A lifelong record closed without a stain,
A blameless memory shrined in deathless
song."

Whooping Cough, Hoop' ing Kof, an infectious cough, confined almost wholly to children, though occasionally attack-

ing adults. The preliminary symptoms are those of a fresh cold; that is, feverishness, watery discharges from the eyes and nose and tightness in the chest. Its particular manifestation is a succession of short, quick, convulsive coughs, followed by a long, noisy inspiration. The coughing comes in paroxysms, and in the intervals between seizures the patient may feel fairly well. The cough lasts from three weeks to two months, and seldom attacks the person more than once, though it may recur two or three times. It appears oftenest in the spring and autumn. In the ordinary course of the affection there is little, if any, danger, but the weakness resulting from the cough may make the patient subject to an attack of pneumonia or bronchitis.

Whooping Crane. See CRANE, sub-head *Whooping Crane*.

Wich' ita, Kan., a manufacturing and agricultural city and the county seat of Sedgwick County, 137 miles southwest of Topeka, on the Arkansas River and on the Atchison, Topeka & Santa Fe, the Missouri Pacific, the Chicago, Rock Island & Pacific, and the Midland Valley railroads. The city, which is an important aviation center, has a well-equipped municipal airport and a number of commercial airports, with air-mail, passenger, and express service over three airways. It is the leading city in the United States in the production of commercial airplanes. It is also one of the country's leading flour-milling centers and has large stock yards, packing plants, and railroad shops. It does an extensive wholesaling, jobbing, and distributing business and is an important broom corn market. Wichita is the seat of a state Masonic home and of the Municipal University of Wichita, Friends' University, Mount Carmel Academy, and St. Johns Institute. The city was founded in 1870 and was chartered as a city in 1871. Population, 92,500.

Wichita Falls, Tex., a manufacturing and jobbing center and the county seat of Wichita County, 114 miles northwest of Fort Worth on the Wichita River; on the Wichita Falls & Southern, the

Fort Worth & Denver, and the Missouri, Kansas & Texas railroads; and on the Colorado to Gulf and other highways. It has a well-equipped municipal airport. Wichita Falls is an important oil-distributing center and has large refineries and extensive manufactories of flour, motor trucks, window glass, fruit jars, brick and tile, lumber, steel, foundry products, sheet metal, winches, clothing, cotton, cottonseed oil, and cheese. It is also a poultry center and has one of the world's largest poultry ranches. It is the seat of a state insane asylum. Population, 58,026.

Wiclif, Wiklif, or Wycliffe, John (about 1320-1384), a noted English reformer, often called the "Morning Star of the Reformation." Little is known of his early life. He was born in Yorkshire and probably belonged to the lower nobility. At the age of 16 he entered Oxford, where he studied Aristotle, theology and law, and became master of Balliol College shortly before 1360. He was rector of the neighboring parish of Fillingham (1361-69), of Ludgarshall (1369-74) and of Lutterworth (1374-84). He became king's chaplain, and entered into close relations with the government, especially with the King's son, John of Gaunt. In this connection he took the part of Edward III and Parliament in the controversies with the Pope over the question of tribute.

On these occasions he expressed opinions concerning the nature of the papal office which led the Pope to write the King, the Archbishop of Canterbury and the University of Oxford to have him tried for heresy; but his championship of national rights was so popular that nothing was done.

Wiclif has been called the "Reformer before the Reformation." He asserted the right of the individual to form his own opinions on the basis of the Bible and reason. In going back of the traditions of the Church to the Bible itself he forecast the Reformation. In order to get this book into the hands of the people, he, with the help of others, translated it into English and sent it out by lay preachers. Aside from its religious influence, Wiclif's

Bible and the tracts in which he appealed directly to the people in their native tongue did much to give form to the growing language. His writings were carried over into Bohemia, where they became the inspiration of John Huss, and through him passed on to the German leaders of the Protestant Reformation.

Widgeon, *Wij' un*, a bird of the Duck and Goose Family. The widgeon is about the size of the domestic duck. The top of the head is white; the head and neck are brownish, speckled with black; the chest is light brownish; the upper parts are gray, crossed by fine, wavy black and white lines; the tail coverts are black; the abdomen is white; and the wing has a green spot surrounded by black, with a white patch above. The breeding habits are similar to those of the American widgeon, or baldpate. The widgeon is a common European game duck, but rarely occurs in North America.

Wieland, *Ve' laht*, **Christoph Martin** (1733-1813), a German author, born at Oberholzheim, in Württemberg. He was professor of philosophy in the University of Erfurt from 1769 to 1772, and later was tutor to Duke Charles Augustus at Weimar. Chief among his works, which gave him an eminent rank among German poets, is his *Oberon*, a romantic epic. His writings, characterized by lightness of touch, beauty, grace and no essential depth, have been published in 40 volumes.

Wig'gin, **Kate Douglas**. See RIGGS, KATE DOUGLAS WIGGIN.

Wight, *Wite*, **Isle of**, an island in the English Channel, separated from the mainland of England by the Solent and Spithead. Its length from east to west is about 23 m., and it has an area of 147 sq. m. The prominent physical feature of the island is the range of chalk downs, extending from the Culver cliffs to the Needles. A great variety of strata is revealed over the island, and the cliffs, of different colors, are of great beauty. The chalk downs afford pasturage for large flocks of sheep. Due to the mildness of the climate, the island has become known as a favorable residence for those suffering from pulmonary diseases. The

death rate is very low. Population, about 82,000.

Wil'berforce, **William** (1759-1833), an English abolitionist and philanthropist, born at Hull and educated at Cambridge. He was a member of Parliament from 1780 to 1825. In 1786 his sympathy became aroused in behalf of the agitation against the slave trade, and thenceforward he devoted his time and energy to the suppression of this evil. After his urging the measure before Parliament year after year, the act forbidding the importation of negroes into British colonies was finally passed in 1807. Having thus secured the abolition of the slave trade, he now fought for the emancipation of those already reduced to slavery, and for 18 years he championed this movement in the House of Commons, when ill health compelled his retirement. His efforts, however, had their reward, when, three days before his death, the act abolishing slavery in British possessions was passed.

Wil'cox, **Ella Wheeler** (1855-1919), an American poet and journalist, born in Johnstown Centre, Wis. She studied at the University of Wisconsin. In 1884 she was married to Robert M. Wilcox of Meriden, Conn. She contributed to the *Chicago American* and the *New York Journal* and published a large number of volumes of poetry. She also won recognition as an advocate of woman's rights. Her works include *Maurine*, *Shells*, *Poems of Passion*, *Poems of Pleasure*, *Poems of Sentiment*, *Kingdom of Love*, *The Beautiful Land of Nod*, *An Erring Woman's Love* and *Poems of Progress and New Thought Pastels*.

Wild Barley. See SQUIRRELTAIL GRASS.

Wild Canary. See GOLDFINCH.

Wild'cat', a name popularly applied in America to any wild member of the Feline, or Cat, Family, as the lynx, puma or jaguar. The European wildcat is a member of the same family found in northern Europe and Asia and in Scotland. It has long, powerful limbs, a thick tail and a stout body, and in habit

is much like other members of the family. This cat is probably not the ancestor of the domestic cat, which is, no doubt, of Egyptian origin. Many cats shot in the forests as wildcats may be feral cats; that is, domestic cats which have become wild and reverted to the hunting habits of their ancestors. Such cats are ferocious when cornered but more shy than the true wildcats. See PUMA; JAGUAR.

Wilde, Oscar O'Flahertie Wills (1856-1900), an English author, born in Dublin, Ireland. At Oxford this brilliant man affected to be the apostle of the new cult which advocated "art for art's sake." During his eccentric and perverse life he wrote comedies distinguished for their sparkling cleverness and literary brilliance, besides poetry and essays. His works include the plays *Lady Windermere's Fan*, *A Woman of No Importance*, *The Importance of Being Earnest* and *Salome*; *De Profundis* and *A Ballad of Reading Gaol*.

Wilder, Thornton. See LITERATURE, *American*.

Wil' derness, Battle of the, the opening engagement of the most severe campaign of the Civil War, Grant's march against Lee in Virginia, with Richmond as a goal, fought May 5 and 6, 1864. The Army of the Potomac, 120,000 strong, was under the immediate command of Meade, supported by Warren, Sedgwick and Hancock. Sheridan led the cavalry. The Army of Northern Virginia, 62,000 strong, was in three corps, under Longstreet, Ewell and Hill. On May 4 Grant crossed the Rapidan, entering the underbrush near Chancellorsville, which was called the Wilderness. Lee was confident that he could defeat the Union troops thus entangled, so Ewell attacked the Federal van, under Warren, on the morning of the 5th. Soon almost the entire two armies were fighting, but by night neither had gained any great advantage. Early the next morning, for Grant and Lee were each planning to take the offensive, Hancock confronted Hill, who was aided by Longstreet in repulsing the Federals.

Another severe day followed and in the end the battle was a draw. The Federals lost about 18,000 men; the Confederates about 12,000. Longstreet was dangerously shot by his own men. On the night of the 6th the Union troops began to move toward Spottsylvania Court house. See CIVIL WAR in AMERICA.

Wild Goose. See CANADA GOOSE.

Wild Rose. See SWEETBRIER.

Wi' ley, Harvey Washington (1844-), a distinguished American chemist, born in Kent, Ind. In 1863 he entered Hanover College, graduating in 1867. During his freshman year he entered the army and at the age of 19 saw five months of service. After completing his college course he studied medicine, then entered the teaching profession. He held several professorships, studied at Harvard and spent a year in Berlin, where he studied chemistry and became interested in pure foods, and in 1883 was appointed chief chemist of the United States Department of Agriculture, retaining this position until his resignation in 1912. As chief chemist he made a notable record, devoting himself fearlessly to the cause of pure food. Dr. Wiley has received various degrees and is affiliated with numerous scientific organizations. He is the author of *Principles and Practice of Agricultural Chemistry* and *Foods and Their Adulterations*.

Wilhelmina, Vil' hel me' nah, Queen (1880-), Queen of Holland. She was born at The Hague and succeeded her father, William III, at the age of ten, her mother being queen regent. She began to rule at 18, and in 1901 she married Henry, Duke of Mecklenburg-Schwerin, who assumed the title of Prince Consort. The birth of an heir, the Princess Juliana, on Apr. 30, 1909, was hailed with great national rejoicing.

Wilkes, Wilks, Charles (1798-1877) an American naval officer and explorer born in New York City. He entered the United States navy as midshipman in 1818, became lieutenant in 1826 and four years later took charge of the division of instruments and charts. In 183

he left Hampton Roads in command of an expedition authorized by Congress to explore the Southern Ocean, stopping at many of the important countries of the South, including New South Wales, and in December, 1839, he sailed from Sydney into the Antarctic, discovering a new land west of the Balleny Islands. Later he visited the Fiji and Hawaiian islands, explored the Columbia River in Oregon, San Francisco Bay and the Sacramento River and returned by way of the Philippines, Sulu Archipelago, Singapore, Polynesia and the Cape of Good Hope. New York was reached on June 10, 1842. The scientific data which Wilkes collected proved to be of great value. At the outbreak of the Civil War he commanded the *San Jacinto*, which, on Nov. 8, 1861, took Mason and Slidell from the British mail packet *Trent* (See TRENT AFFAIR). In July, 1866, Wilkes was promoted to be rear-admiral on the retired list.

Wilkes-Barre, Wilks'-Bar" y, Pa., a city and county seat of Luzerne Co., 100 m. n.w. of Philadelphia, 176 m. n.w. of New York and 17 m. s.w. of Scranton, on the north branch of the Susquehanna River and on the Lehigh Valley, the Delaware & Hudson, the Delaware, Lackawanna & Western, the Central Railroad of New Jersey, the Wilkes-Barre & Eastern, the Pennsylvania and other railroads. Wilkes-Barre is one of the most beautiful and progressive cities of the interior of the state. It is situated in a rich anthracite region in the historic Wyoming Valley and is surrounded by beautiful scenery. Various interurban lines connect the city with many boroughs and hamlets throughout the Wyoming and Lackawanna valleys. Several iron bridges connect Wilkes-Barre with Kingston and other boroughs on the opposite side of the river. The city contains many miles of well-paved streets and avenues shaded with beautiful trees, and there are fine drives to many neighboring places of interest. Among the city parks are Hollenback, Riverside, the River Common, Public Square and the Frances Slocum playground.

Among the most noteworthy buildings are the courthouse, city hall, Ninth Regiment Armory, post office, Memorial Hall, several fine clubhouses, a number of banks, Y. M. C. A. and Y. W. C. A. buildings and the Wyoming Historical and Geological Society Museum. The educational institutions include the Harry Hillman Academy (nonsectarian) for boys; Wilkes-Barre Institute (Presbyterian), a school for girls; St. Mary's Academy for girls; Mallinckrodt Convent School, public and parish schools, business colleges, a high school, Osterhout Free Library and the Law and Library Association. Other benevolent and charitable institutions include the city, Mercy, Homeopathic and West Side hospitals, Home for Homeless Women, Shelter and Day Nursery and Home for Friendless Children.

Wilkes-Barre is known as the center of one of the most productive anthracite regions in the United States, and there are many mines and washeries. Among the industrial plants of the city are large railroad repair shops, wire-rope works, foundries and machine shops, axle works, silk and lace mills, breweries, cutlery works and manufactories of underwear, shirts, automobiles, locomotives, tobacco, tinware, adding machines, flour and clothing.

The first settlement was made in May, 1769, by people from Connecticut under command of Maj. John Durkee. This settlement was made under the auspices of the Susquehanna Company. A fort was built which was known as Ft. Durkee. This name was later changed to Wilkes-Barre in honor of John Wilkes and Col. Isaac Barre, both strong defenders in Parliament of the American cause. In the Revolutionary War, immediately after the Battle of Wyoming in 1778, Wilkes-Barre was burned by the British and Indians. A monument now marks the site of the battleground at Wyoming, a suburb of the city. Wilkes-Barre is known as the birthplace of the anthracite mining industry. Here stone coal, as it was called, was first used for fires in blacksmiths' shops and

here anthracite first came into use for domestic purposes. Wilkes-Barre was incorporated as a borough in 1806 and incorporated as a city in 1871. Pop., 1920, 73,828; estimated, 1925, 77,644.

Wil'kins, Mary Eleanor. See FREE-MAN, MARY ELEANOR WILKINS.

Wilkinsburg, Pa., a city of Allegheny Co., 5 m. e. of Pittsburgh, on the Pennsylvania Railroad. It is an attractive residential suburb of Pittsburgh and contains many handsome residences. Its business interests are identified with those of Pittsburgh. A home for aged Protestant women and the United Presbyterian Home for the Aged are located here. The town, which was formerly called McNairville and then Rippeyville, was given its present name in honor of William Wilkins, secretary of war in 1844-5 under President Tyler. It was incorporated as a borough in 1887. Pop., 1920, 24,403; estimated, 1925, 27,392.

Will, the mental capability of choosing. Psychology up to the present time has considered it one of the three powers of the mind—feeling, knowing and willing. Willing differs from feeling in being always represented by activity; thus we may feel the cold, but we exercise our will in deciding to close the window. It differs from knowing, in consciously forcing the active attention to an idea; just as we may know that the cold comes from the window's being open without deciding either to close it or to leave it open. Modern psychology instead of referring these three powers to certain constant faculties of the mind, considers that there is no definite faculty called the will, but instead a number of endless volitions. As a background for these volitions we have our many past experiences which influence us in our decisions and thus in our power of willing.

There can be no definite line of demarcation between knowing, feeling and willing. Deliberation has elements of both knowing and willing, but the act of willing is incomplete until a choice has been made. The child in exercising his will goes through the five distinct phases of impulse, desire, deliberation, choice

and action. In the mature mind the steps are so closely connected that many of them seem scarcely to exist.

The will, however, is not only concerned with action, but also with the prevention of action, a state of consciousness commonly known as inhibition. In either case, to have the consciousness of a will action, the end must have been anticipated from the beginning; without that, no *willing* is possible. The success of the will depends upon the ability to hold this end so completely before the consciousness that no restraining or modifying influences can turn one from it. In modern psychology there is no such thing as a training of a special faculty called the will as we would develop a muscle by exercise, but rather a persistent training of attention to the end that is sought. To learn to will is not important, but rather to learn to hold tenaciously to what was aimed at rather than to be pushed about by chance impressions. Inefficiency in education no doubt comes from faulty training in this very line. Any work thoroughly performed aids in the development of persistence in the accomplishment of purpose, while superficial work hinders it. An education which only follows the likings and which rushes from impression to impression as the interest changes is harmful as well as ineffective. Persistent effort, formal training and direction of the will toward the right ends renders a person a force in any sphere of usefulness.

Will, in law, a document providing for the disposal of one's property after death. Strictly speaking, the will can dispose of real estate only, and personal property must be disposed of by a document called a testament. In most states it is customary to combine these documents in one, calling it the *will and testament*. In order to be valid a will must be in writing and signed by the maker, who is known in law as the *testator*, or by someone in his presence and under his authority. It must also be signed by two witnesses who are disinterested parties and who were present when the

will was made. An addition to a will is called a *codicil*. The testator may set a will aside by destroying it or by making another which will replace it. In case more than one will is left, the last is the one usually accepted by the court. The will usually names the executors, who shall see that its provisions are carried out. In case no executors are named, the probate court before whom the will is adjudicated appoints an administrator of the estate.

Willamette, Wi lah' met, River, a river of Oregon. It is formed by the junction of the McKenzie and the Middle Fork in the west-central part of the state, flows northward and enters the Columbia a few miles north of Portland. It is navigable for large boats to Portland, and, with the aid of canalized sections around obstructions, to Eugene for smaller boats.

Willard, Emma Hart (1787-1870), an American educator, born in Portland, Conn. At 16 she began teaching, when 22 married Dr. John Willard, and, a pioneer for higher education of women, established a girls' seminary at Waterford, N. Y. Afterwards removed to Troy, where the school was incorporated as the Troy Female Seminary, this institution was under Mrs. Willard's management until 1838, and is now called the Emma Willard School. Mrs. Willard was interested in a woman's school in Athens, Greece. She wrote widely on educational subjects. Her *Rocked In the Cradle of the Deep* has always been popular.

Willard, Frances Elizabeth (1839-1898), an American educator, reformer and author, born at Churchville, N. Y. Her parents moved from New York to Wisconsin, and later to Evanston, Ill., where Miss Willard attended the Northwestern Female College, now incorporated with Northwestern University. Upon graduating she became professor of natural sciences in her alma mater. Later she was preceptress of Wesleyan Seminary at Lima, N. Y., and afterwards professor of æsthetics in Northwestern University and dean of the

Woman's College. In 1874 she resigned her position at Northwestern University to engage wholly in the work of temperance reform. That year she became secretary of the Woman's Christian Temperance Union, and in 1879 president of the organization, continuing to hold that office until her death. In 1892 she visited England and was instrumental in securing the organization of the World's Woman's Christian Temperance Union. She was for six years editor-in-chief of the *Union Signal*. Miss Willard was one of the most remarkable women of her age, and her work is monumental. She wrote several books, among which we may mention *Nineteen Beautiful Years*, *Women and Temperance*, *Glimpses of Fifty Years* and *A Great Mother*.

William, Wil' yum, I, also called the Conqueror (1027-1087), Duke of Normandy and King of England. He was the son of Robert, Duke of Normandy, and the daughter of a tanner of Falaise. By 1047 he had succeeded in establishing himself in his father's dukedom. When Edward the Confessor died, William invaded England and defeated Harold, the newly-elected Saxon successor of Edward, at the Battle of Hastings in 1066 (See HASTINGS, BATTLE of), but the whole country was not under his control until 1072. William was far in advance of his age. He strengthened the royal power by reforming the Church in England, while he freed it from the power of the barons by establishing separate ecclesiastical courts and by appointing wise and learned men, such as Lanfranc, to important positions. He had a census of the country taken (See DOMESDAY BOOK), and avoided the main weakness of the feudal system by exacting an oath of allegiance to himself from all landowners.

William I (1797-1888), King of Prussia and Emperor of Germany. He was the second son of Frederick William III of Prussia. While fighting with the allies against Napoleon, he received the Cross of St. George from Alexander of Russia for his bravery on the battle-

field. In 1858 he became regent and succeeded his brother as King of Prussia in 1861. His army reforms were vindicated in the victorious wars with Denmark and Austria. By the diplomacy of Bismarck, a North German Confederation was formed with William I at the head, and a treaty of alliance was made with the South German states. At the close of the war with France, the present German Empire was formed with William I as emperor.

William II (1859-), the last German Emperor and King of Prussia, son of Frederick III. He received a thorough military training, and studied law and political science in the University of Bonn. On his father's death in 1888, he succeeded to the throne.

More than usual interest attaches to the life of William II since he was the central figure in the World War which occasioned the political revolution of 1918-19 whereby the German Empire became the Republic of Germany; and as a further result of that momentous change the House of Hohenzollern that for more than eight centuries had been influential in German history ceased to exist as a ruling house. Strangely contradictory traits of character manifest themselves in the public life of William II.

He was active in the development of Germany in the days of the empire. Probably no nation in history made more rapid advance in power, wealth, and influence than did Germany during the years of his reign.

The very success Germany thus won led to the overthrow of that nation and the downfall of William II. Behind him were seven centuries of history during which the House of Hohenzollern, of which he was the head, had grown in power from the Mark of Brandenburg through the Kingdom of Prussia, to the empire of Germany. He began to dream of world dominion as the next stage of advance, and to make that dream real, he devoted the restless energies of his nature, working through the years to lay the foundation of success. Finally he risked all on the World War, and lost.

When the commissioners of Germany were on their way to sign the armistice terms, William II, knowing the end had come, abdicated the throne, November 9, 1918, and fled for protection to Holland.

William III (1650-1702), King of Great Britain and Ireland and stadtholder of Netherlands, son of William II of Orange. In 1677 he married Princess Mary, the daughter of the King of England, James II. In 1688 the English people, stirred to revolt by the reactionary policy of their ruler, invited William and Mary to assume the throne of England. In February, 1689, having accepted the Declaration of Rights, they were proclaimed King and Queen of England. Scotland and Ireland kept up a struggle in favor of James for some time, but the death of Dundee ended the resistance of the former, and the Battle of Boyne (1690), by the breaking of the power of the Jacobites, the latter. In 1693 William was badly defeated at Neerwinden by the French, and forced to sign the Peace of Ryswick in 1697. After the death of his wife in 1694 his popularity declined and his plans were thwarted by Parliament. During his reign the modern system of finance was introduced, the bank of England founded, ministerial responsibility recognized and the liberty of the press secured.

William and Mary College, a coeducational state institution at Williamsburg, Va., founded in 1693 and named for King William and Queen Mary, from whom the charter was obtained. Rev. James Blair was its first president. During the Revolution it was closed for a time when its buildings were occupied by the American and then by the British forces. Again in 1861, during the Civil War, the college was closed because nearly all of its students joined the Confederate or Federal armies. The college suffered some financial losses during the war and between 1881 and 1888 remained closed for lack of funds. In 1893 Congress granted it an indemnity of \$64,000 for losses sustained during the Civil War. It maintains a college and a normal de-

partment and has a library of more than 35,000 volumes.

William of Orange (1533-1584), Count of Nassau and leader of the revolt of Netherlands against Spain. He is known in history as William the Silent. In 1544 he inherited the Principality of Orange from his cousin and was sent to the Queen Regent's court in Brussels, where he was brought up in the Catholic faith. In 1555 he was given command of the imperial army on the French frontier by Emperor Charles V, and in 1559 he was employed by Philip II in the negotiation of the Treaty of Cateau-Cambrésis. On returning to the Low Countries he openly opposed Cardinal Granvella and refused to allow edicts against heretics to take effect in his provinces of Holland, Zealand and Utrecht, of which he was stadtholder.

When the Duke of Alva entered Netherlands to enforce the decrees of the Spanish ruler, William withdrew to Germany to prepare for the struggle against Spanish tyranny, and he began open resistance in 1568. Spain, however, gained fortress after fortress, and William's army was not large enough to cope successfully with the enemy. In April, 1574, Louis and Henry of Nassau were slain, but William rescued Leyden from the terrible fate which had befallen Haarlem. At this time he openly professed Protestantism. In 1575 Holland and Zealand pronounced the deposition of Philip, and, roused by the cruelty of the Spanish troops, the remaining 15 provinces in 1576 entered with these provinces into the league known as the Pacification of Ghent, to drive out the invaders and to establish religious toleration. After much discouragement, William finally brought about the Union of Utrecht (1579), which marked the birth of the Dutch Republic. This league consisted of the seven northern provinces. In 1581 the United Provinces declared Philip deposed. Meantime Philip had put a price on William's head, and he was assassinated at Delft in 1584.

Williams, John Sharp (1854-), an American congressman, born in

Memphis, Tenn. He studied at the Kentucky Military Institute, at the University of the South and at the universities of Virginia and at Heidelberg, being admitted to the Tennessee bar in 1877. The following year he began to practice in Yazoo City, Miss., where he became a cotton planter. A Democrat, he sat in Congress from 1893 to 1909, receiving all votes cast for the Sixtieth Congress and being minority leader. In 1908 he was elected for the term 1911-1917 to succeed United States Senator H. D. Money and re-elected in 1916.

Williams, Roger (about 1604-1683), founder of Rhode Island Colony and pioneer of religious liberty, born in London. He graduated at Cambridge in 1627 and was admitted to orders in the Church of England; but, adopting the most advanced views of the Puritans, he emigrated to America in 1631. After serving as assistant pastor at Salem and at Plymouth, he returned to Salem as pastor in 1633. During this time he had been engaged in controversy with the Massachusetts authorities, denying the jurisdiction of civil magistrates in matters of religious belief. For this heresy he was tried and banished to England; but he escaped and went to Rhode Island, where in 1636 he established a settlement which he called Providence. Here he founded the first Baptist Church in America. He later went to England and secured a charter for "The Providence Plantations in Narragansett Bay" (1644). Rhode Island became the refuge for men of all religious convictions. Williams was prominent in the affairs of the colony until his death, part of the time as governor and partly in other capacities. He learned the Indian language, and was of great service to the New England Colonies in dealing with the Indians. Among many other works he wrote *A Key into the Language of the Indians of America*.

Williamsburg, Wil' yamz burg, Battle of, during the Civil War the first important engagement of the Peninsula Campaign, fought May 5, 1862, near Yorktown, Va. The Confederates were

under Longstreet; the Federals, under Sumner. At the end of the day the battle was indecisive, and the Confederates retreated under cover of darkness toward Richmond. McClellan moved the Union army to White House, at the head of the York River.

Williams College, at Williamstown, Mass., (1793), a non-sectarian institution for men. It was developed from a free school established by the will of Col. Ephraim Williams, killed in 1755 at the head of his troops in the advance upon Crown Point. Its high rank is partly due to the influence of Mark Hopkins, who was its president from 1836 to 1872. The Institute of Politics, an annual conference for the purpose of advancing the study of politics and promoting a better understanding of international problems, was founded at Williams in 1919 and held its first session in 1921. Enrollment of the college, about 800.

Williamsport, Pa., a manufacturing, agricultural, and mining center and the county seat of Lycoming County, 70 miles north of Harrisburg, on the West Branch of the Susquehanna River and on the Pennsylvania, the Reading, the Susquehanna & New York, and the New York Central railroads. It has a commercial airport. Williamsport is picturesquely situated on a high plain 528 feet above sea level and is nearly surrounded by hills. Brandon Park, Ways Garden, and Memorial Park, an amusement and tourist center, are among the city's attractive pleasure grounds.

The location of Williamsport in the center of Pennsylvania's great coal, iron, and lumber regions makes it an important point for the production and distribution of manufactured products. The city was once one of the country's leading lumber centers and a one-industry town. About 85 different industries are now located here. Among the most important products are automobile, airplane, and marine motors, sole leather, rubber goods, including rubber footwear, wire rope, crepe paper, valves and hydrants, sandpaper, steel products, furniture, sash and doors, floors, lumber, silk, boilers,

and shoes. There are also railroad shops of the Reading Railroad. Dickinson Seminary (coeducational, Methodist Episcopal), established in 1848, is the leading educational institution.

Williamsport was founded in 1796, incorporated as a borough in 1806, and chartered as a city in 1866. It has the commission form of government. Population, 43,100.

Willingdon, Freeman Freeman-Thomas, 1st Viscount (1866-), a British statesman, appointed governor general of Canada in 1926. Descended from distinguished lineage connected with Sussex, England, he was educated at Eton and Cambridge, where he was noted for his achievements as captain of the cricket elevens. He started his official life in 1895 as aid-de-camp to Lord Brassy, then governor of Victoria, Australia, whose daughter he had married in 1892. From 1905 to 1912 he was junior lord of the treasury. His ten years' career in the House of Commons terminated in 1910, when he received a peerage. His success as governor of Bombay (1913-19), where he proved his administrative ability during the trying days of the World War, led to his appointment as governor of Madras (1919-24). He represented India at the Assembly of the League of Nations in 1924 and headed the delegation from the Boxer Indemnity Committee which visited China in 1926.

Willimantic, Conn., a manufacturing and educational center and one of the county seats of Windham County, 28 miles southeast of Hartford at the junction of the Willimantic and Natchaug rivers and on the New York, New Haven & Hartford and the Central Vermont railroads. It is situated 17 miles from the Thames River and has store door delivery by water to New York three times a week via the Thames River Line. Poultry-raising is an extensive industry of the surrounding country. The Willimantic has a fall of 91 feet within the city limits and furnishes waterpower for manufacturing. There is a large manufactory of cotton threads, and other products include silk, silk velvets, silk

crepe, silk broadcloths, and foundry products. Willimantic is the seat of a state normal school, a state trade school, and a state model school, and the state agricultural college is seven miles distant. The place was founded in 1686. It was incorporated as a borough in 1833 and as a city in 1893. Population, 13,100.

Wil'tis, Nathaniel Parker (1806-1867), an American author, born in Portland, Me. He graduated at Yale College in 1827, established the *American Monthly Magazine* at Boston in 1829, and two years later went to Europe as correspondent of the *New York Mirror*. He later established and edited several short-lived periodicals, but the *Home Journal* was continued until his death. He wrote in a light and graceful style, and though his writings lack enduring merit, they are not without interest and at one time won general recognition. They include *Inklings of Adventure*, *Pencillings by the Way*, *Letters from under a Bridge*, *Life Here and There*, *Hurry-Graphs*, *Ragbag* and *Paul Fane*.

Will-o'-the-Wisp. See IGNIS FATUUS.

Wil'low, a name given to a number of trees classed together in the Willow Family. They are all water-loving trees or shrubs, with watery juice, scaly bark and soft, white wood. The branches are slender and graceful and filled with a soft, removable pulp, which makes them popular with the boy who seeks a good branch for a whistle. The leaves are long, narrow and shiny, generally pointed at both ends and smooth at the margin. The flowers are in catkins which differ in size, shape and appearance according to the species upon which they grow. The fruit is a dry capsule of small brown or black seeds.

Willows grow on banks of streams and in moist ground from Arctic regions south as far as the Chilean Andes on the American continent, and in the Old World as far south as northern Africa. Nearly 200 species of willow are known, 70 of which are found in North America. Those of the coldest regions are usually shrubs, while those of the temperate and

tropical regions are large trees with thick trunks and an enormous spread of branches.

The commonest willows include: the osiers, whose tough, flexible branches are valuable for basketry; the black willow, whose bark contains a large amount of tannin and is used both in tanneries and as medicine; the sand-bar willow, with small narrow leaves; the glaucous willow, which produces the "pussies" of earliest spring; and the weeping, or Napoleon, willow, whose pendulous, dripping branches are continually shedding tears. All of the willows are easily propagated, and a stick or post of willow driven into the ground will put forth leaves and roots.

Willow wood is light, soft and durable; it is employed for fuel, in the manufacture of charcoal for gunpowder and crayon, in the manufacture of hoops and for work under water. The willow is the home for innumerable insects; in America 223 species have been found living upon willows of different varieties.

Wilmington, Del., the largest city and most important commercial and manufacturing center in the state, a port of entry, and the county seat of New Castle County, 26 miles southwest of Philadelphia, on the Delaware River at the mouth of the Christiana and Brandywine rivers and on the Pennsylvania, the Baltimore & Ohio, and the Reading railroads. Several lines of steamers also connect the city with Philadelphia and Delaware Bay and with Atlantic and Pacific ports. The marine terminal has berthing space for five large ocean-going vessels, with covered and open storage facilities. Wilmington is the port of entry of the customs district of Delaware. The city is the northern terminus of DuPont Boulevard which extends the length of the state. It has a well-equipped airport, Bellanca Field.

Among the contributing factors to Wilmington's industrial greatness are its proximity to rich coal and iron fields, the 126-foot falls of the Brandywine, four miles from its mouth, and its deep harbor for docking and building ships.

Shipbuilding was established as early as 1739 and in 1854 the first iron sailing boat constructed in the United States was built here. Today the city has large shipbuilding yards. From 1802 until after the World War the DuPont Powder Mills were situated about two miles from the city limits. This huge organization furnished about 40 per cent of all the explosives used by the Allied armies during the World War. The general offices of the DuPont company are still maintained at Wilmington. The city manufactures a great variety of products, among the most important of which are glazed kid, vulcanized fiber, machinery, rubber products, collapsible tubes, and iron and steel. There are also large bleaching and finishing works and extensive railroad shops.

Wilmington is an attractive city, picturesquely situated on hilly ground, with beautiful parks and pleasure grounds. Among the noteworthy parks are Brandywine Natural Park and Coolspring Park. Holy Trinity (Old Swedes) Church, dating from 1698, is the most interesting relic of its colonial past.

Among the educational institutions are the Wilmington Friends' School, established in 1748, the oldest preparatory school in the state; Ursuline Academy (girls, Roman Catholic), the Misses Hebbs' School (girls, non-sectarian); and Tower Hill School (coeducational). Situated in or near Wilmington are the State Hospital for the Insane, the Home of Merciful Rest, and the Home for Friendless and Destitute Children.

In 1638 Swedish colonists settled on the site of Wilmington under the leadership of Peter Minuit and founded a little village, Christinaham. In 1655 the territory was taken by the Dutch, and nine years later the Dutch rulers were succeeded by the English. In 1737 Thomas Willing laid out a new town, which was called Willingtown, but the name was later changed to Wilmington in honor of an English peer. The first borough charter was given in 1739, and in 1832 the place was incorporated as a city. Population, 126,400.

Wilmington, N. C., a seaport and industrial center, the county seat of New Hanover County, and the second city in the state. It is situated 150 miles southeast of Raleigh, on the Cape Fear River about 28 miles from its mouth, and on the Seaboard Air Line, the Atlantic Coast Line, and the Wilmington, Brunswick & Southern railroads. It has a county airport. The depth of the river is periodically increased by the federal government, and Wilmington has an important trade both foreign and coastwise. The chief exports are cotton, lumber, fertilizer, and petroleum products. Molasses is among the leading imports. The manufacture of fertilizer is an important industry, and other products include lumber and lumber products, cotton products, foundry products, concrete products, and pickles. Among the city's leading institutions is a Red Cross tuberculosis sanitarium, supported jointly by the city and county and by private subscriptions. Wilmington was founded in 1730 as New Liverpool and was later named Newtown. In 1739 the town was incorporated under the present name and in 1866 a city charter was granted. It was an important strategic point during the Civil War and was the center of communication between the Confederate States and foreign governments. With the capitulation of Fort Fisher, 18 miles south (Jan., 1865), Wilmington fell, thus closing to Gen. Robert E. Lee his last source of supply. Population, 37,700.

Wil'mot Provi'so, a name given to an amendment offered in the United States Congress by David Wilmot, a Democrat from Pennsylvania, in 1846, pending the consideration of a bill placing \$2,000,000 at the disposal of President Polk to provide for the purchase of territory from Mexico. The amendment provided that neither slavery nor involuntary servitude should ever exist in any part of such territory except for crime whereof the party should first be duly convicted. The amendment was adopted in the House but did not come

to a vote in the Senate. At the next session of Congress, Wilmot again introduced it and the amendment was again passed in the House by a decided majority, but was not acted upon by the Senate. It caused great agitation throughout the country, and the principle involved continued to be an important factor in party politics.

Wilson, Augusta Jane Evans (1835-1909), an American novelist, born near Columbus, Ga. She was educated under the direction of her mother, and in 1856, published her first novel, *Inez*. In 1863, while nursing wounded Confederate soldiers in a private hospital, near Mobile, Ala., she wrote portions of *Mac-aria*, which was published in 1864. She was married to Lorenzo N. Wilson in 1868, but usually wrote under her maiden name. Her novels, most of which were very popular in her day, include *Beulah*, *St. Elmo*, *Vashti*, and *Infelice*.

Wilson, James (1742-1798), an American jurist and a signer of the Declaration of Independence. He was born near St. Andrews, Scotland, was educated at Glasgow and Edinburgh, and came to America in 1765. He was twice a member of the Continental Congress, was advocate general for France from 1779, was a member of the Constitutional Convention in 1787, and was one of the first judges of the Supreme Court of the United States (1789-98). In 1790 he became the first professor of law at the University of Pennsylvania.

Wilson, N. C., an agricultural town and the county seat of Wilson County, 50 miles southeast of Raleigh, on the Atlantic Coast Line and the Norfolk & Southern railroads. It is an important tobacco market and manufactures tobacco, trucks and bus bodies, cotton, wagons, and knitted goods. It is the seat of Atlantic Christian College (co-educational). Population, 13,200.

Wilson, Woodrow (1856-1924), an American educator, author, and statesman—the twenty-eighth president of the United States. Although he

abhorred war, it became his duty, as chief executive, to lead the nation through the most terrible crisis in the history of the world. His efforts to maintain his country's neutrality and to keep the United States out of the awful conflict, raging in Europe, were set at naught by the ruthless submarine warfare of Germany. His influence in bringing about the final collapse of the autocratic government of the German Empire by his masterful state papers, ostensibly addressed to the American Congress but actually prepared to break the morale of the people of the Central Empires, can hardly be over-estimated. It was to him, rather than to the French or British Governments, that the Teutonic peace proposals were made and in his replies he outlined the general principles on which a just and enduring peace was to be based.

Woodrow Wilson was of Scotch-Irish ancestry. His grandfather, James Wilson, an Ulsterman, emigrated from County Down in 1807 and settled in Philadelphia, becoming the editor and owner of two newspapers. The youngest of James Wilson's seven sons was Joseph Wilson, who became a distinguished teacher and clergyman of the Presbyterian Church, South. It was while the Rev. Joseph Wilson held a pastorate at Staunton, Va., that a son christened Thomas Woodrow Wilson was born on December 28, 1856. Later in life, the son dropped the name Thomas and was called Woodrow. He entered Princeton University in September 1875 and soon won distinction for his literary activities. He was managing editor of the Princetonian during his senior year, also contributing to the Nassau Literary Magazine, a prize essay on William Pitt, Earl of Chatham. He graduated in 1879 receiving his bachelor's degree and then entered the law school of the University of Virginia, but did not complete the term because of a physical breakdown due to over-study. He began the practice of law in Atlanta, Georgia, in 1882, but he was more deeply

interested in political science and jurisprudence and as the clients were few, he gave up his practice and entered Johns-Hopkins University in 1883 where he began post-graduate study.

He took his degree at Johns-Hopkins University in 1885 and was immediately appointed associate professor of history and political science at Bryn Mawr College and was professor of these subjects at Wesleyan University, Middletown, Connecticut, from 1888 to 1890. He took the chair of jurisprudence at Princeton in that year and in 1902 became president of that institution succeeding Dr. Patten. He held this office until 1910 and during his presidency at Princeton became one of the leaders of educational thought in America, introducing many reforms in the course of study and methods of teaching.

During these years of educational activity, he produced a number of volumes on political science and history which secured his election to the American Academy of Arts and Letters, the American Philosophical Society and other literary organizations. His *Congressional Government: A Study in American Politics* was submitted as a thesis for his doctor's degree and it immediately took its place as a political classic. Among his other books are *The State: Elements of Historical and Practical Politics*; *Division and Reunion*; *Mere Literature and other Essays*; *Constitutional Government in the United States*; *George Washington*; *When a Man Comes to Himself*; *The New Freedom*; and a five volume work, *A History of the American People*.

In 1910, the progressive wave in politics which swept the country, struck New Jersey which had long been dominated by the spoils politicians. That year the Democratic state convention nominated Woodrow Wilson for governor on the first ballot. He accepted the nomination without hesitation and in his speech of acceptance he outlined his policies which were carried out almost to the letter during his administration, in spite of the

active opposition of reactionary politicians. His program and reforms included Equalization of taxes; Revision of the corporation laws; a Corrupt Practice Act; Employer's Liability Law; Reorganization and Economy in Administration. His record as Governor of New Jersey was so striking that the progressives in the national Democratic convention at Baltimore in 1912, led by William J. Bryan, nominated him for the presidency. The Republican vote of that year was divided between Roosevelt and Taft and Wilson was elected by a large plurality vote. He received 435 electoral votes against Roosevelt's 88 and Taft's 8. The popular vote being 6,286,214 for Wilson, 4,126,020 for Roosevelt and 3,483,922 for Taft.

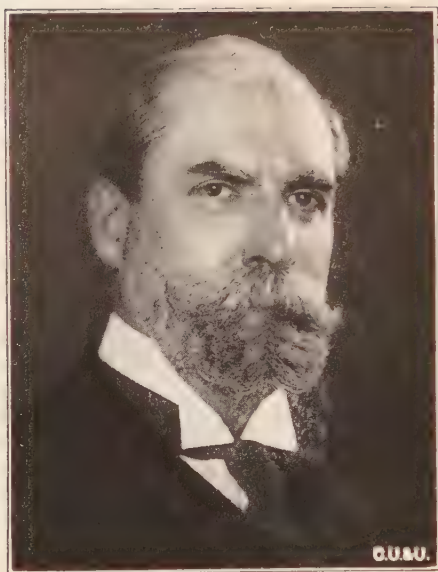
Immediately after his inauguration as President, he summoned Congress in special session for the purpose of revising the tariff which had been one of the prominent issues of the campaign. The Underwood-Simmons bill which was finally passed reduced the duties to a level of about 20% as a whole in spite of the strong opposition of the "stand pat" element in both houses. The Federal Reserve Act was also passed at this session of Congress. Other important bills which became laws were The Clayton Anti-Trust Act, and the Trade Commission Act. The Panama Canal tolls exemption clause was repealed at the request of Great Britain.

During the years 1913-14 the Mexican problem became the leading issue and a strong agitation was started by certain interests for intervention in Mexico. The President, however, adopted his "watchful waiting" policy until April 1914 when a number of American marines were arrested at Tampico by a Mexican officer. This led to the occupation of Vera Cruz by the U. S. April 20, 1914. Further intervention was prevented by the offer of the "ABC" powers (Argentina, Brazil and Chile) to mediate which was accepted by the United States and Mexico. While the commissioners were in session at Niagara Falls, Huerta, whose agents

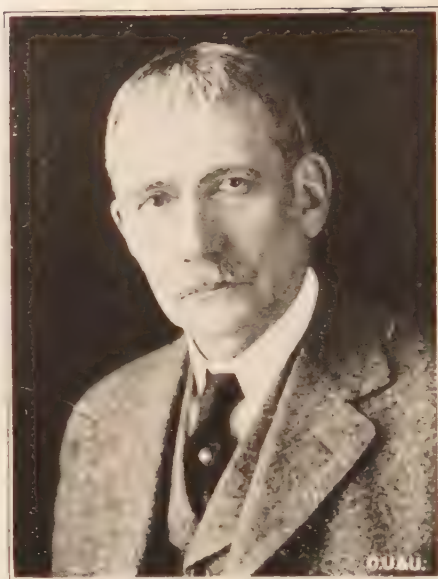


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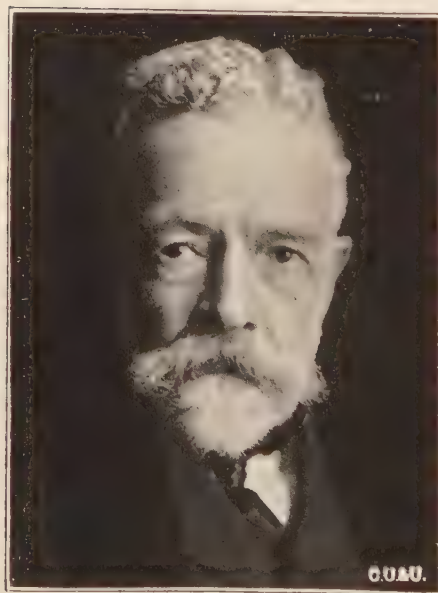
WOODROW WILSON



CHARLES E. HUGHES



ELIHU ROOT



HENRY CABOT LODGE



OSCAR UNDERWOOD

Modern Statesmen who represented the United States at the Disarmament Conference.

had treacherously murdered President Madero and who had seized the office of president by force resigned and a month later Carranza became president. This removed the immediate cause of friction between the two countries. Carranza and his chief of staff, Francisco Villa, soon quarreled, however, and this brought on another revolution. Villa was finally driven into Chihuahua and from there a number of raids were made by him into American territory. Gen. John Pershing with a small force of American soldiers was sent into Mexico to get Villa "dead or alive," but because of the restrictions placed on their movements by Carranza, the "Punitive Expedition" failed in the accomplishment of its main purpose, namely, the capture of Villa.

The National Democratic convention met at St. Louis in the summer of 1916 and renominated President Wilson and he was re-elected in November, defeating Chas. E. Hughes, who resigned as one of the justices of the United States Supreme Court in order to become the Republican Presidential Nominee, by a vote of 277 to 254. One of the chief campaign slogans of the President's managers was "He kept us out of War," but the action of the German government in disregarding all the rights of neutrals in carrying on their ruthless submarine campaign and causing the loss of many American lives compelled the President to convene a special session of Congress and on April 6, 1917, Congress declared a state of war to exist between the United States and Germany and authorized the President to use the military and naval forces to prosecute the war, voting a war loan and passing a Universal Military Service Law. The President soon became the spokesman of the Allies as well as of America in defining their war aims and his speeches and state papers were masterpieces in arousing the enthusiasm and keeping up the morale of the people.

January 8, 1918, he appeared before a joint

session of the two houses of Congress and delivered the famous address of war aims setting forth the fourteen points which were accepted by Germany as a basis for peace in November.

Some of the important events of Wilson's second administration, besides those mentioned were *The Federal Farm Loan Act*, *Women's Suffrage Amendment* submitted to the states for ratification, *National Prohibition Amendment* adopted, *operation by the Government of the railroads and telegraph and cable lines*.

The Liberty and Victory Loans totaled more than \$22,000,000,000.

As soon as the terms of the armistice were accepted, November 11, 1918, preparations were begun for the peace conference and President Wilson became at once the central figure upon whom the attention of the world was fixed. To overcome the many disadvantages of discussion by cable, the President decided to attend the conference in person and sailed on the George Washington December 4. On his arrival in France, he was greeted by great throngs and many celebrations were held in his honor. He took a leading part in the discussion and although frequently outvoted, he was responsible for most of the liberal policies adopted. He worked in close harmony with Lloyd George to bring about a real League of Nations and although he was criticized severely for making too many concessions to the conservatives, he worked steadily for a settlement that would make the peace a lasting one. The Peace Treaty was signed at Versailles, France, June 28, 1919. Immediately after the signing of the treaty between the Allies and Associated Powers on the one hand and Germany on the other, President Wilson returned to the United States.

The Senate refused to ratify the Peace Treaty and the President undertook a speaking tour in its favor. His health broke down and he was compelled to return to Washington where he kept to his bed many months. The senate finally returned the treaty to him with "fourteen" reservations, only one of which—that which proposed the elimination of Article X from the covenant of the League of Nations—was important. This reservation would have destroyed the needful sanction for the establishment of an international army or navy without which, in possible contingencies, Wilson felt no league of nations could function. Thus a deadlock was reached and there was nothing left to do but await the next election to see whether Wilson or his opponents in Congress would be supported by the country. An overwhelming Republican victory was the result of that election. For the remainder of Wilson's term little of note occurred, most controversial matters being held over for the incoming administration. After the reins were turned over to President Harding in 1921, Mr. Wilson, who never fully regained his health, continued to live in Washington until his death early in 1924. See EUROPEAN WAR, page 4092.

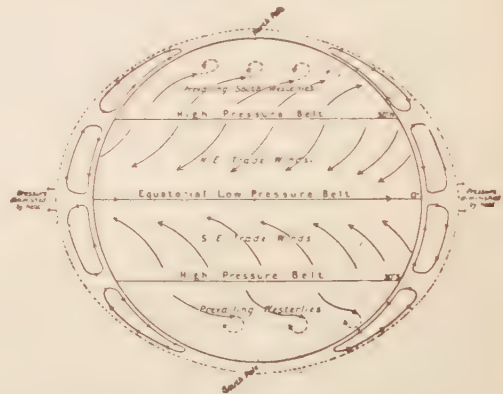
Wilson's Creek, Battle of, an engagement of the Civil War, fought near Springfield, Mo., Aug. 10, 1861. Here Lyon and Sigel, with 5000 Federals, surprised the Confederate general, McCulloch, with his Missouri and Arkansas reinforcements, over 12,000 strong. Federals lost 1200, including Lyon, and Sigel withdrew to Springfield. Though victorious, the Confederates suffered heavily.

Winchester, Mass., a residential town of Middlesex County, eight miles northwest of Boston, on Mystic Lake and on the Boston & Maine railroad. The leading industries are the manufacture of leather, machinery, watch hands, and gelatin. Population, 11,800.

Winchester, Battle of, an engagement of the Civil War, fought near Winchester, Va., Sept. 19, 1864, when 40,000 Federals, under Sheridan, attacked an equal number of Confederates, under Early. The first attack was repulsed, but upon a second attack the Confederates fled to Winchester. Sheridan captured about 25,000 prisoners. The engagement is also known as the Battle of Opequon Creek. It was from Winchester that Sheridan started on his famous ride to Cedar Creek.

Wind, a sensible movement of the air. Winds are caused by changes in temperature, and the great body of atmosphere is constantly in motion. As air is heated it expands and becomes lighter; therefore when the atmosphere of any region has its temperature raised above that of surrounding regions, the heavier and cooler air of these regions forces the warm air upwards and presses in to fill the space thus left vacant. The air at the equator is the warmest and lightest and that at the pole the coldest and heaviest. The cold air is constantly pressing towards the equator and forcing the air of the hot equatorial belt upward. As this warm air rises, however, its temperature is lowered until it finally becomes of the same temperature and density as the air of the upper regions. At this level its vertical movement is changed to a horizontal movement.

Theoretically then, the general circulation of the atmosphere consists of: (1) a warm upward current over the equatorial region; (2) on each side of this region, surface currents moving towards the equator; and (3) in the upper air, currents moving from the equatorial region towards the poles. This simple theory is, however, subject to many modifications. When the upper currents flowing towards the poles reach the latitude of the tropics, they have become of the same density as the underlying layers of atmosphere; consequently they descend gradually to the surface, counteracting the surface currents flowing towards the equator and producing re-



GENERAL CIRCULATION OF THE ATMOSPHERE

gions of calms known respectively as the calms of Cancer and the calms of Capricorn (See CALMS, REGIONS OF). After passing these regions of calms these currents become surface currents flowing towards the poles (See PREVAILING WESTERLIES). For about 30° on each side of the equator there are strong constant surface currents flowing towards the equatorial regions (See TRADE WINDS). This general plan of the circulation of the atmosphere is clearly shown in the illustration accompanying the article.

Were it not for the rotation of the earth, the currents flowing towards and from the equatorial regions would flow directly north and south. The velocity

of rotation at the poles is zero, and at the equator it exceeds 1000 m. an hour. Surface currents flowing towards the equator are constantly entering regions of greater velocity, and since they are unable to acquire this velocity instantly they lag behind and form easterly winds. Thus in the Southern Hemisphere the trade winds blow from the southeast and in the Northern Hemisphere they blow from the northeast. Surface currents flowing towards the poles are constantly entering regions of a lower velocity of rotation, and, as it were, run ahead of the land, forming westerly winds.

Winds are much more constant on the ocean than on land, where they are deflected by mountain ranges. Hence the problem of local winds becomes very complex and often baffles the efforts of the most expert meteorologists. See ATMOSPHERE; WEATHER BUREAU.

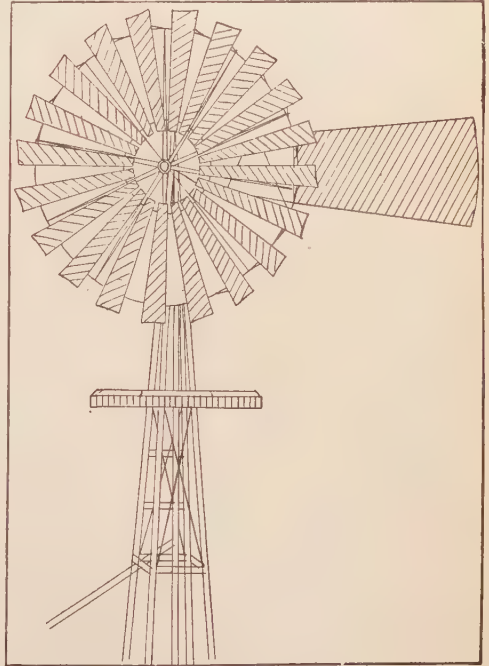
Wind'ber, Pa., a city of Somerset Co., 21 m. n.e. of Somerset, and about 60 m. from Pittsburgh, on the Pennsylvania Railroad. Extensive mines of anthracite have been opened in the vicinity and coal mining and shipping is the chief industry. Beds of iron ore are found in the county. Windber has blast furnaces, ironworks, planing mills, etc. Paint and Windber boroughs were incorporated from parts of Paint Township in 1900. Population in 1920, 9462.

Windemere, Win' der meer, Lake, one of the largest and most beautiful lakes in England. It is situated on the borders of Westmoreland and Lancashire counties, is $10\frac{1}{2}$ m. long and about 1 m. wide. There is a group of islands in its center.

Wind'lass, a contrivance for raising weights by winding a rope or chain around a cylinder. The windlass is a modification of the wheel and axle, and it usually consists of a roller several inches in diameter and two or three feet long, mounted in bearings and with holes in each end, into which bars or hand spikes can be inserted for rotating it. As the roller is turned, it winds up a rope or chain, which raises the weight. When a windlass is employed to raise buckets

of water from a well, it is provided with a winch, generally at both ends of the roller. By gearing the roller down to drums, on which cranks are fitted, the power of the windlass can be greatly increased and heavier weights lifted. See DERRICK.

Wind'mill', a machine having a wheel driven by the wind for power purposes. Windmills have been used in Europe since the 12th century. Those in Holland usually have a power wheel of four radial arms covered with canvas,



WINDMILL

revolving on an axis nearly horizontal. The diameters of these wheels are very large, some extending to 150 ft., a common size being 50 ft. They have various devices for setting them to face the wind, the usual method being to turn around the whole tower, which rests on wheels for this purpose.

The American windmill usually consists of a wheel formed of a large number of narrow, radial, inclined arms of metal or wood rotating on a horizontal

axis, the direction of the wheel being governed by a rudder or vane extending at right angles to the rear face of the wheel. Suitable gearing is employed to change the speed to that required for pumping water and other purposes. The structure is mounted on a lofty tower of light steel construction. These windmills develop from $\frac{1}{4}$ -to 4-horsepower, and the number of hours they work depends upon weather conditions, the average being eight hours per day. Where continuous service is not important and for pumping water on a farm, windmills offer the cheapest power obtainable.

Windsor, Ontario, a manufacturing city of Essex County on the Detroit River opposite Detroit, Mich., with which it is connected by ferries and by a traffic tunnel under the river. The Ambassador Traffic Bridge spans the river between Walkerville, near by, and Detroit. The city of Windsor, and the contiguous towns along the river of Walkerville, Ford City, Riverside, Tecumseh, Sandwich, Ojibway, La Salle, and Amherstburg, though they are separate municipalities, form one large industrial community and have amalgamated many of their public services. They are known in Canada as the "Border Cities," and are the southern gateway to the Dominion. They are served by the Canadian National, the Canadian Pacific, the Wabash, the Michigan Central, and the Pere Marquette railways, and have one airport.

While there are wide and varied industries, these cities stand preeminent in Canada in automobile-manufacturing, in which more than 15,000 persons are employed. Other iron and steel products include machine and rolled steel products, structural steel, steel wire, castings, machinery, etc. There are more than 30 plants producing chemicals and allied products, including liquid chlorine, caustic soda, drugs, toilet preparations, and paints. Alcoholic beverages, canned vegetables and fruits, cement products, brick and tile,

wood and paper products, and textiles are other extensive manufactures. Power is obtained from Niagara Falls.

Windsor is the seat of St. Mary's Academy, for girls; of Assumption College, affiliated with the University of Western Ontario, at London; and of Windsor-Walkerville Technical School. The city was incorporated in 1854. Population, 68,659; of the Border Cities, 115,000.

Windsor Castle, an English royal residence located at Windsor, 21 m. w. of London on the Thames. It is built upon a slight rise of land said to be the mound where King Arthur and his knights frequently assembled, and its massive round tower at the center is visible from a great distance upon all sides. A moat-encircled stronghold stood here until the time of William the Conqueror, who was attracted by its forests and chose it as his royal home. Since his time it has been a favorite residence of English sovereigns and has been added to, changed and remodeled. In the vault beneath are buried Henry VI, Edward IV, Henry VIII, Jane Seymour, Charles I, George IV and Edward VII. Albert Chapel, a memorial to the Prince Consort, built by Queen Victoria, is among the most beautiful structures.

Wind'ward Islands, the name often applied to the more southerly group of the West Indies, including Martinique, St. Lucia, St. Vincent, the Grenadines and Grenada. Some geographers, also include the Barbados, Tobago and Trinidad in the group.

Wine, a term applied generally to the fermented juice of the grape. From freshly gathered grapes that have been pressed the juice, or must, is drawn off and allowed to stand until fermentation sets in. This is assisted by the yeast that exists in the must, the process being hastened by stirring the must each day until the sugar present is converted by further fermentation into alcohol. When wine is bottled before fermenta-

tion is complete, a sparkling wine is produced. Red wines and white wines take their names from the town, district or vineyard in which they are produced. The greatest wine-producing countries are in southern Europe, while much was obtained from the United States. California produced the largest quantity and variety, while the Ohio Valley and northwestern New York were also important wine-producing regions. See CHAMPAGNE; PORT WINE.

Winkelried, *Vin' kel reet*, Arnold, a Swiss peasant who, according to legend, is said to have enabled the Swiss to gain the victory over the Austrians at the Battle of Sempach, 1386. According to tradition, Winkelried gathered in his arms as many spears of the Austrian phalanx as he could and pressed them into his breast, thus making it possible for the Swiss to break the phalanx. By many authorities, Winkelried is considered a purely mythical character, but the evidence is insufficient to prove or disprove their assertion.

Win'nipeg, Manitoba From a trading post of the Hudson's Bay Company in 1870, the capital of the Province of Manitoba, Canada, has grown to be the financial, commercial, and wholesale center for Western Canada and, with the exception of Liverpool, the greatest grain market in the British Commonwealth of Nations. Winnipeg is situated at the junction of the Red and Assiniboine rivers, and on the Canadian National, Canadian Pacific, and other railroads. It is 60 m. n. of the United States boundary.

Winnipeg has more than 30 public parks and squares and many children's playgrounds. Among the city's outstanding public buildings are the Provincial Parliament Building, Canadian Pacific and Canadian National railway terminals with their respective hotels—Royal Alexandra and Fort Garry—Board of Trade, courthouse, post-office, and the public library. Main Street and Portage Avenue are the leading business streets.

The city has a fine system of public schools, and there are churches representative of many denominations. The Uni-

versity of Manitoba, situated here, includes Manitoba, St. John's and St. Boniface, Wesley, and Manitoba Medical colleges. The provincial agricultural college is located on the outskirts of Winnipeg.

The water supply for Winnipeg and the surrounding territory is brought from Shoal Lake by a great aqueduct nearly 100 miles long, which was completed in 1919. By means of a central heating system, installed in 1924, heat was made available to the entire business district of the city.

Winnipeg is the central market and clearing house for all grain and the livestock market for all cattle in Western Canada. It is also an important manufacturing center, due to the boundless electric power supplied from the Winnipeg River, 60 miles distant. The city owns a hydroelectric plant and power is sold to consumers at a low rate. Flour, food products, metal and wood work, clothing, structural steel, lumber products, and leather goods are among the leading products. Stone, marble and glass manufactures are other important industries. There are abattoirs and packing-houses in the city. The Canadian Pacific has built here the largest individually owned railway yards in the world.

The city council is composed of a mayor (elected annually by a vote of the entire city) and 18 aldermen. Three aldermen are elected annually from each of the three wards into which the city is divided and hold office for two years.

As Fort Garry, Winnipeg was originally an old post of the Hudson's Bay Company, and was associated with the earliest days of trapping and fur trading. The first house built on the site of the city was erected on an open plain in 1860. Winnipeg, so named from the lake 45 miles north, was incorporated in 1874. Population, 1923, 180,000.

Winnipeg, Lake, situated in the north-central part of Manitoba. Its extreme width is 60 m. and its length is about 260 m. The coast is rocky and irregular on one side and flat and marshy on the other. The lake is fed by the

Winnipeg, the Saskatchewan, Assiniboine and Red rivers, and the Nelson River is the outlet.

Win'nipego'sis, Lake, situated in the northwestern part of Manitoba, Canada, about 50 m. west of Lake Winnipeg. It is about 120 m. long and 20 m. wide and is navigable for vessels drawing 10 ft. of water. The lake is fed by the Red Deer, Swan and smaller rivers and the Waterhen River is the outlet.

Wino'na, Minn., a manufacturing city and agricultural center and the county seat of Winona County, about 100 miles southeast of St. Paul, on the Mississippi River, and on the Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy, the Chicago Great Western, the Chicago & North Western, and the Green Bay & Western railroads. Winona is picturesquely situated on a level terrace which rises several feet above the river (here spanned by several bridges), and is surrounded by bluffs from 400 to 500 feet high. There are several attractive parks, including Whitewater State Park. With its excellent transportation facilities, the city is an important shipping center with a large trade in agricultural products, livestock, and lumber. It has varied manufactures, including patent medicines, toilet preparations, canned goods, cold-storage insulations, packing house products, tinware, foundry and machine-shop products, flour, lumber products, and brick. The Chicago & North Western Railroad has shops here. There are also extensive dairy interests. The leading educational institutions of Winona are the Winona State Teachers College, established in 1860; College of St. Teresa (women; Roman Catholic); and St. Mary's College (boys; Roman Catholic).

Winona was settled in 1851 on the site of old fur-trading posts, and was originally called Wabasha Prairie. It received its city charter in 1857. The place suffered from a destructive fire in 1860. Population, 19,500.

Winslow, Wins'lo, Edward (1595-1655), governor of Plymouth Colony, born at Droitwich, in Worcestershire, England, of notable family. While traveling, he identified himself with the Pilgrims at Leyden. Conceded to have been the best man of affairs in the colony which settled at Plymouth, he was active in all its early expeditions, was an Indian hostage pending peace negotiations with Massasoit, and secured for his people, as a result of a visit to England in 1623, the privilege of making a plantation. He became governor in 1633 and again in 1636 and in 1644. In 1635 he petitioned England's aid against French encroachments for Plymouth and Massachusetts colonies. In 1655 Cromwell commissioned him to superintend the expedition of the British to the Spanish West Indies. Dying of fever en route, he was buried at sea with military rites. Winslow was the first New England statesman. His *Good Newes from New England* (1624) is one of the earliest accounts of that region.

Winslow, John Ancrum (1811-1873), an American naval officer, born at Wilmington, N. C. Being appointed midshipman in 1827, he distinguished himself in the Mexican War, became commander in 1855, and in 1861 was attached to the Mississippi flotilla. In 1862 he was made captain of the *Kearsarge*, and, while proceeding to Europe in search of Confederate privateers, on June 19, 1864, sank the *Alabama*, which was commanded by Semmes, off Cherbourg, France. Winslow had been challenged to the combat which ended in the Confederate defeat. For this action he was promoted commodore. Following the war, he commanded in turn the Gulf Squadron, the Pacific Squadron and the navy yard at Portsmouth, meanwhile, in March, 1870, being promoted rear-admiral. See ALABAMA CLAIMS.

Winston-Salem, N. C., an industrial center, the largest city in the state, and the county seat of Forsyth County, 115 miles northwest of Raleigh, on the Southern, the Norfolk & Western, and the Winston-Salem Southbound rail-

roads. The industrial interests are centered chiefly in Winston, which has important manufacturing establishments and wholesale houses. The city is situated in a region famous for the production of tobacco and is one of the world's leading centers for the manufacture of tobacco products. It leads the world in the manufacture of heavy knit underwear and has one of the world's largest rayon hosiery mills. It is an important center for the manufacture of furniture and blankets, and other articles produced in large quantities include humidifiers, cotton goods, caskets, dairy products, fertilizer, boxes, lumber, wagons, flour, and foundry and machine-shop products. The Salem part of the city is chiefly a residential and educational settlement. Salem Academy and College (women, Moravian) and Winston-Salem Teachers College, a state institution for colored students, are the principal educational institutions. The first settlement on the site of Salem was made by the Moravians in 1766. Winston was selected as the county seat in 1851. The two places were consolidated in 1913. Population, 71,800.

Win'ter, the season of the year beginning when the sun enters Capricorn, at the winter solstice, Dec. 21-23, and continuing for about 89 days until the sun reaches the first point of Aries at the vernal equinox, about March 21-23. At the winter solstice the sun has reached its lowest point in the southern sky and begins its ascent, reversing the conditions following the summer solstice. See **SPRING**; **SUMMER**; **AUTUMN**; **SEASONS**.

Win'tergreen", a plant of the Heath Family, found in many varieties in the damp or sandy woods of the North. As its name implies, it is an evergreen plant, with shiny, roundish leaves borne on short delicate stems. The young leaves are reddish-brown and tender and have the distinct wintergreen flavor which makes them pleasant to the taste. The older leaves are tough and fibrous. The stems rarely grow to six inches in height, but in the woods where

they are found they grow in such profusion as to carpet the ground thickly. The flowers are small and nodding, greenish or pinkish-white, and in the fall these are followed by large, bright red berries which bear at their apex the thickened, succulent calyx. These berries are sought by the children and are also of importance commercially, for they provide the oil of wintergreen, useful as a flavoring extract and as a medicine. Some authorities class the wintergreen in a family by itself, the Wintergreen Family, but more commonly it is considered a member of the Heath Family. The wintergreen is a native of America.

Win'throp, John (1588-1649), first American governor of Massachusetts Colony, born in Suffolk County, England. He was of good family, spent two years at Cambridge and married into a wealthy family at the age of 17. He entered the profession of law and became a local magistrate. Conditions in England under Charles I, and especially the persecutions of the Puritans with whom he was in sympathy, led him to emigrate to Massachusetts in 1630, whither he carried the charter of the colony, the Massachusetts Company having resolved to transfer the government to America. Winthrop was governor in 1630-34, 1637-40, 1642-44 and from 1646 until his death; and was actively engaged in the affairs of the colony at all times. He helped to form the New England Confederation, and was its first president. He lived to see Boston, which he had founded, a thriving and prosperous capital, and Massachusetts extended to settlements over a wide territory. A careful journal of events which he kept furnishes the most authentic history of the early days of the colony.

Winthrop, John (1606-1676), a colonial governor of Connecticut, son of John Winthrop, first governor of Massachusetts Bay, born at Groton Manor in Suffolk, England. He was educated at Trinity College, Dublin, and at the Inner Temple. He had traveled on the Continent as far as Constantinople. In 1631 he joined his father in New England.

Four years later he was commissioned governor of Saybrook, and in 1646 he began a plantation on the Thames River, at what is now New London. Of this he was governor in 1657 and from 1660 until his death, and for it, in 1662, he received a most liberal charter from Charles II. He was very influential in uniting the colonies of Connecticut and New Haven, and in 1675 he was a commissioner of the United Colonies of New England.

Wire Glass. See GLASS, subhead *Wire Glass*.

Wire'less Tele'graphy. See TELEGRAPHY AND TELEPHONY, RADIO.

Wire'less Tel'ephone. See TELEGRAPHY AND TELEPHONY, RADIO.

Wire'worm'. See CLICK BEETLE.

Wisconsin. Out of a beautiful forest wilderness where the Winnebago, the Potawatami, and the Menominee Indians once hunted and fished has been created a thriving state with vast fields of waving grain and busy cities humming with the machinery of many factories. The beauty still remains in the sparkling lakes and swift-running streams, the wooded dales and dark pine forests that draw thousands of summer tourists within Wisconsin's borders each year.

Wisconsin, a north-central state, was the farthest northwest and the last state created entirely from the old Northwest Territory. Though it is off the main line of east and west continental travel, it was early marked for commercial importance by the two great water-highways which form a great part of its boundaries—Lake Superior on the north and Lake Michigan on the east and the Mississippi River and its tributary, the St. Croix, on the west. It is the 25th state in the Union in size. From north to south it measures about 320 miles, its greatest breadth is about 300 miles, and its area 56,066 square miles, excluding 9,878 square miles of Great Lakes water surface within its jurisdiction. Its lake-shore boundary is more than 550 miles long. Included within the state's limits

are the beautiful Apostle Islands in Lake Superior and a group at the entrance to Green Bay.

SURFACE. The surface of Wisconsin is a gently rolling plain occupying a swell of land between the depressions of lakes Superior and Michigan and the Mississippi River. It rises in the north-central portion to nearly 2,000 feet and falls to 580 feet along the Lake Michigan shore. Rib Hill (1,940 ft.) in Marathon County is the highest point in the state. There are three main drainage basins. A north-and-south rise of land just east of the center of the state forms a water-shed separating the rivers flowing into the Mississippi from those flowing into Lake Michigan. From an east-and-west elevation about 30 miles south of Lake Superior a few short streams fall abruptly into that body of water. The Mississippi, into which flow the St. Croix, Chippewa, Black and Wisconsin rivers, drains the greater part of the state. Lake Michigan receives the waters of the Menominee, the Oconto, the Fox, and the Milwaukee rivers and of a few smaller streams. Across the southern part of the state a broad shallow diagonal valley is formed by Green Bay, the Fox River, Lake Winnebago (the largest lake) and the Wisconsin River. Pre-glacial erosion and the glaciers of the Ice Age have carved out rugged bluffs and fantastically shaped boulders along the Mississippi and elsewhere, and have formed more than 2,000 lovely lakes, most of them in the north and east. In the south Lake Geneva, Green Lake, and the famous "four lakes" near Madison are favorite summer resorts. The rapids or "dalles" of some of the rivers are very beautiful, notably the Dalles of the St. Croix and the "Dells" of the Wisconsin.

POPULATION. In population Wisconsin ranks 13th among the states. The 1920 census showed a total of 2,632,067 persons, an increase of 12.8 per cent over 1910. About 80 per cent are native-born whites, and 9,611 are Indians who live on reservations. More than one-third of the

foreign-born inhabitants are Germans, and another third is composed of Poles and Scandinavians. There are also numbers of Russians, Czechs, Austrians, Italians, British, Swiss, Dutch and Fins.

CLIMATE AND SOIL. The winters are long in the northern part of the state and somewhat severe although this severity is tempered by the dryness of the atmosphere. In summer the day temperature often rises to 90 degrees or more in the southern and central parts of the state, but the nights are cool, and the summer weather as a whole is delightful. The climate is bracing and healthful and supplements the scenery and the excellent trout fishing in bringing thousands of tourists annually into Wisconsin.

The glacial drift, which covers all but the southwest corner of the state, has overlaid the land with sand, gravel, clay, and marl, to which have been added vegetable mold and other organic matter, forming a most fertile soil. The unglaciated region in the southwest is known as the "driftless area." The granite, sandstone, and limestone formations have been most valuable to the state, as have also the iron ore from the Penokee-Gogebic and Menominee ranges, and the zinc and lead deposits of the southwest.

FORESTS AND LUMBER. The dense forests of northern Wisconsin once yielded great quantities of white pine, as well as Norway pine, hemlock, and spruce, while farther south were hard woods, of which white oak was the most abundant, and maple, birch, white elm, basswood, ash, and other woods were common. As recently as the early years of the 20th century Wisconsin was the leading lumber state in the Union, but its resources have been heavily drawn upon and now it has dropped to 11th place. It still ranks among the first, however, in the production of hemlock, maple, birch, white elm, and basswood. In 1905 a forest reserve was created, to be increased each year.

INDUSTRIES. For some time manufacturing and agriculture have vied for first place among Wisconsin's industries, with manufacturing slightly in the lead, according to the last census. Lumbering, in

which Wisconsin was once the leading state, is less important than formerly, as was stated above. Wisconsin is not a leading mining state, though the famous Lake Superior iron ore district extends into its territory (in the Gogebic and Menominee ranges) and in the amount of iron ore mined yearly, it ranks fifth among the states. The output of the lead and zinc mines in the southwestern part of the state is slightly less in value than that of the iron mines, and Wisconsin holds sixth place among the states producing these minerals. Valuable granite quarries are well distributed throughout the state, producing the famous Montello and other varieties of building granite. There are also extensive sandstone and limestone quarries, and sand, gravel, and excellent clay for the manufacture of brick and tile are found in many districts. In its production of mineral water, Wisconsin is the leading state, Waukesha and Chippewa Falls being the producing centers. The fisheries provide another source of income. The fish taken include trout, lake herring, buffalo fish, yellow perch, German carp, pike and whitefish. State hatcheries are maintained at Madison, Bayfield, Oshkosh, Minocqua, Delafield, Wild Rose, Sturgeon Bay, Sheboygan, Spooner, Eagle River and St. Croix Falls, and are in charge of a state conservation commission. Sport fishing under license in the rivers and streams is also extensive.

AGRICULTURE. An ample rainfall, a fertile soil, and a favorable climate make Wisconsin an ideal agricultural state for all products grown in the cool temperate regions. Eighty-five per cent of the farmers own the land they cultivate. Hay, corn, potatoes, oats, wheat, barley, tobacco and rye are the chief crops in the order of their importance. Flax and hemp, vegetables (especially cabbage and peas), and both small and large fruits are other large crops. Wisconsin is the leading pea-canning state. In the south-central part of the state are large cranberry marshes. Sugar beets are grown extensively and there are a number of sugar beet factories.

Wisconsin is admirably adapted to raising livestock, and large numbers of cattle, horses, sheep, and swine are supplied to the nearby markets. It has more dairy cattle than any other state and also has first place in the

value of its dairy products, including cheese. The state agricultural college, a part of the University of Wisconsin, has been a great contributing factor in the state's agricultural success. The Babcock test for butter fat in milk invented by Prof. Stephen Babcock, who refused to patent it, and four other important dairy tests which originated there, are used all over the world. Its improved strains of grain won the world championship in 1910.

MANUFACTURES. Wisconsin is the tenth state in the Union in the value of its manufactured products. The abundant water-power at its command, and the cheap transportation afforded by the Great Lakes, have been large factors in its manufacturing prominence. Coal is lacking in the state, but the large coal docks at the lake ports are kept busy with incoming shipments. Wisconsin leads the states in and derives the largest income from its dairy products, including butter, cheese and condensed milk. Foundry and machine shop products rank second, and other manufactures in the order of their value are automobiles, including bodies and parts; packed meats; leather, for which hides are imported from all over the globe; lumber and timber products (formerly the leading manufacture); paper and wood pulp, a large and increasing interest, in which Wisconsin ranks fourth among the states; flour mill and gristmill products; boots and shoes; ship- and boat-building; hosiery and knit goods, and agricultural implements, in which Wisconsin is second only to Illinois. Railway cars and engines, copper, tin, aluminum and sheet iron products, printed matter and paints also are worthy of note in the long list of manufactures. Milwaukee, the chief manufacturing center, produces one-third of the manufactured products. Other manufacturing centers are Racine, Kenosha, West Allis, Superior, Sheboygan, Green Bay, Oshkosh, Manitowoc, Beloit, La Crosse and Madison.

TRANSPORTATION AND COMMERCE. Wisconsin is situated on two of the greatest inland water routes in the United States and is amply supplied with railway systems which reach all parts of the state. The Michigan shore has a number of good harbors and Milwaukee, the chief port of entry, and Racine, Sheboygan and Manitowoc, handle millions of tons of freight each year—iron ore, lumber, dairy products, grain, manufactured products, etc. A ship canal at Sturgeon Bay connects Lake Michigan with Green Bay, on which Marinette and Green Bay are important ports. The canal from the Fox River to the Wisconsin River at Portage opens up a water route connecting the Mississippi with Lake Michigan. Superior is the chief port on Lake Superior and the outlet for the products from the northwestern part of the state. The Duluth-Superior harbor is one of the greatest inland harbors in the United States. The rivers afford transportation for logs and lum-

ber. Besides the water transportation, there are between 7,000 and 8,000 miles of railroad in the state. The principal lines are the Chicago, Milwaukee and St. Paul; the Northwestern line; the Minneapolis, St. Paul & Sault Ste. Marie, and the Chicago, Burlington & Quincy.

GOVERNMENT. The constitution adopted in 1848 is still in force, although it has been frequently amended.

The governor, lieutenant-governor, secretary of state, treasurer and attorney-general are elected at a general election and hold office for two years. The superintendent of public instruction is elected at a spring election for a term of four years. The legislative body consists of a Senate elected for four years and an Assembly chosen for two years. The number of representatives is limited to not less than 54 and not more than 100, and the number of senators cannot be less than one-fourth nor more than one-third of the number of representatives.

The judicial power is vested in a Supreme Court of seven judges elected for a term of ten years; and in 20 Circuit Courts, consisting of one judge for each circuit except that including Milwaukee, which has six branches; these judges are elected by the voters of each circuit district. A county judge is elected for each county and serves for a term of six years. Local justice is administered by justices of the peace who are elected for a term of two years.

Politically, Wisconsin has a strongly marked individuality, which is perhaps the most interesting feature of the state. In national politics, it has been Republican since 1856, except for two elections. In recent years, the state has been a pioneer in the enactment of experimental and progressive legislation. The "Wisconsin idea" is in general "an attempt to make democracy more workable and efficient and an attempt to reduce economic inequalities of opportunity." In working it out, the adoption of a direct primary law, of a limited form of initiative, referendum, and recall, and of measures for the prevention of monopolies and unfair discrimination in buying and selling, and many other industrial measures have been taken. In initiating all these reforms, Robert M. La Follette, during his governorship from 1901 to 1906, took a leading part. Another interesting feature of the government is the administration of its legislation by commissions composed in part at least of recognized experts. Among the most important of these are public utilities commissions, a tax commission and an industrial commission, which administer all labor laws, factory regulations, and the Workmen's Compensation Act. There are laws regulating the hours of work for women, a minimum wage law, laws prohibiting the employment of children under 14 years of age, and in some occupations under 16 years of age, and laws providing for mothers' pensions, and establishing a bonus for World War soldiers.

EDUCATION. Wisconsin has one of the most complete and progressive systems of public schools in the Union. Education is compulsory in rural districts for six months and in cities for eight months for children from seven to fourteen who do not live more than two miles from a school. Both the high schools and the graded schools receive state aid. A large school fund has been provided through the sale of school lands, and this is supplemented by state and local taxation. The schools are under the supervision of a superintendent of public instruction. The education and training of teachers are provided for in state normal schools located at Eau Claire, Milwaukee, Oshkosh, Platteville, Stevens Point, River Falls, Whitewater, Superior and La Crosse. Wisconsin was the first state to establish county normal schools for the training of rural teachers. Vocational education has been largely developed in recent years.

Higher educational institutions include the University of Wisconsin at Madison, once called by Professor Eliot of Harvard, the leading state university (See WISCONSIN, UNIVERSITY OF); Beloit College at Beloit; Carroll College at Waukesha; Lawrence College at Appleton; Concordia College, Marquette University, and Milwaukee-Downer College for women, all at Milwaukee; Milton College at Milton; Northwestern College at Watertown; Ripon College at Ripon; Campion College at Prairie du Chien; and St. Lawrence College at Mt. Calvary.

STATE INSTITUTIONS. There is a state board of control in Wisconsin which has charge of the following institutions: state hospitals for the insane at Mendota, Winnebago, and Waupun; a school for the deaf at Delavan; a school for the blind at Janesville; an industrial school for boys at Waukesha and one for girls at Milwaukee; a school for dependent children at Sparta; homes for the feeble-minded at Chippewa Falls and Union Grove; a reformatory at Green Bay; a state prison at Waupun; a psychiatric institute at Mendota; an industrial home for women at Taycheedah; a state sanitarium at Wales and a camp on Tomahawk Lake for tuberculosis patients.

CITIES. Milwaukee is the largest city and the chief industrial center. The other important cities, arranged in the order of their population, are Racine, Kenosha, Superior, Madison, the state capital, Oshkosh, Green Bay, Sheboygan, La Crosse, Fond du Lac, Beloit, Eau Claire, Appleton, Wausau, Janesville, Manitowoc, West Allis, Marinette, Waukesha, Stevens Point and Ashland.

HISTORY. Jean Nicolet, a French explorer sent out by Champlain, is supposed to have been the first white man to reach the forest wilderness that is now Wisconsin, when in 1634 he steered his birch-bark canoe into Green Bay. During the latter half of the 17th century, other French explorers and Jesuit missionaries traversed the territory, and settlements soon sprang up. The first mission was founded in

1665 near Ashland by Father Claude Allouez. The territory remained under French control until at the close of the French and Indian War it passed into the hands of the British. French influence still survives in the names of some of the cities, such as Eau Claire, Fond du Lac, Prairie du Chien, etc. Wisconsin was included in the territory ceded to the United States at the close of the Revolutionary War, but the British did not evacuate the adjacent military posts until 1796 owing to disputes which John Jay was sent to England to settle (See JAY TREATY). Previous to the War of 1812, however, there were few American settlers in the territory, and in that war the settlers retained their British allegiance against the United States. For some time development was slow in the region and fur trading remained the chief occupation. In 1826, however, lead mines were opened in the southwestern part of the state and there was a rush of immigration. Curiously enough, it was these lead miners who gave Wisconsin its nickname of "Badger State". They were called badgers because they lived in dugouts on the hillsides, similar to the under-ground burrows of those little animals, and remained near the mines during the winter months. Afterward the name was applied to the whole state. The settlers were harassed more or less by the Indians at this period and these difficulties culminated in the Black Hawk War in 1832 (See BLACK HAWK WAR), which practically settled the Indian disputes for this part of the United States.

As to governmental organization, the region that is now Wisconsin was included in Northwest Territory in 1787. Later it belonged to Indiana, Illinois and Michigan territories at different periods. In 1836, Wisconsin Territory was organized, including Minnesota, Iowa and a portion of the Dakotas, as well as the present state, and in 1848 it became a state with its present limits. An unsuccessful revolutionary movement in Germany that same year drove thousands of Germans to the United States, a large proportion of whom settled in Wisconsin.

Wisconsin took an active part in the Civil War and adopted the policy of keeping its regiments full instead of sending new regiments. Ninety-one thousand troops, or one-ninth of the state's total population served in the Union army. In the Spanish-American War she took an equally creditable part. Of her record in the World War Wisconsin may well be proud. She led all other states in recruiting and equipping her National Guard; she was the first state to organize a State Council of Defense, the first state to give aid to soldiers' dependents, and the first state to inaugurate wheatless and meatless days. She overtopped every liberty loan quota and war drive activity, and raised more than \$350,000,000 or nearly \$140 to every person in the state. She sent 118,000 of the flower of her youth into military service—18,000 National Guard troops, 90,000

selected men, and 10,000 men who enlisted in the navy, the regular army, or in the National Guard after it entered the United States service. There were 8,000 casualties, of whom 1,800 were killed or died of wounds. Three companies of the National Guard became the 150th Machine Gun Battalion of the famous Rainbow Division. The war was also fought in Wisconsin's fields, where sturdy farmers toiled to make every acre yield its utmost, and in her factories where workers slaved day and night fashioning the implements of war. It was fought by her women, who were organized 80,000 strong by the Women's Committee of the State Council of Defense. Wisconsin women working for the Red Cross knitted 500,000 articles and made 500,000 surgical dressings. Among its many contributions in men and science, the state university furnished the inventor of the famous submarine detector, Prof. Max Mason of the department of physics.

Wisconsin River, the largest river in Wisconsin. It rises on the Michigan border in the north-central part of the state, flows southward, then southwestward and enters the Mississippi about 4 m. south of Prairie du Chien. Its length is about 600 m., and formerly it was navigable to Portage; however, the construction of a number of dams has rendered navigation impracticable. There are a number of gorges, rapids and waterfalls along its course. The most famous gorge is the Dalles at Kilbourn City.

Wisconsin, University of, at Madison (1838). The University of Wisconsin ranks among the largest of American higher institutions and serves the people of its state with remarkable efficiency in all the usual ways, and in some that are quite exceptional. Organized under a second charter in 1848, it first opened in 1851. Its beautiful and extensive site stretches for more than a mile along the shore of Lake Mendota; and, as its many great buildings are of modern architecture, its campus is one of the most attractive in the country. The university comprises colleges of letters and science, agriculture, engineering, law, music, medicine and a graduate department. It maintains an extension department of unusual scope, being designed to reach every town and hamlet in the state. It also has regular freshman and college work

in each of the state normal schools. The university is at the head of the school system of the state and is by law affiliated with all other state institutions and the high schools. The university's income exceeds \$2,900,000. For its library of 253,000 volumes and the 300,000 volumes of the Wisconsin State Historical Society, the state has erected a magnificent building at a cost of \$650,000. The university enrolls about 5000 students.

Wise, Henry Alexander (1806-1876), an American diplomat, born in Drummondtown, Va. He was admitted to the bar in 1828, and settled for a time in Tennessee, but, returning to Accomac County, was there elected to Congress in 1832. In 1844-47 he was minister to Brazil. He zealously advocated the annexation of Texas. From 1856 to 1860 he was governor of Virginia, and the last official act of importance during his administration was the ordering of the execution of John Brown for raiding Harper's Ferry. Early in 1861 Wise advocated a peaceful settlement of difficulties with the National Government, but when war broke out he took up arms, became a Confederate brigadier-general, led in western Virginia and commanded at Roanoke Island. He wrote *Seven Decades of the Union*.

Wista'ria, or **Wiste'ria**, a high-climbing, ornamental shrub of the Pulse, or Pea, Family, having stems which twine for many yards over bushes, fences or about trees. The plant is found wild in the Southern and Western states, but farther north is cultivated as a lawn shrub. The stems are smooth and branching, and the leaves, made up of four to six pairs of rounding leaflets, present a particularly graceful appearance. The flowers are butterflylike, resembling the sweet pea in form, but their color is always a red-lilac, a shade which has come to be called wistaria. The Chinese and Japanese wistarias are rapidly-growing vines, bearing many flowers and feathery leaves.

Wister, Owen (1860-), an American writer, born in Philadelphia, Pa. He graduated at Harvard in 1882, and

at Harvard Law School in 1888, and was admitted to the Philadelphia Bar in 1889, but since 1891 he has devoted himself almost entirely to literature. His stories deal largely with Western life and characters, in which field he has been very successful. Among his published works are, *The Dragon of Wantley*, a fantasy, 1892; *Red Man and White*, 1896; *Lin McLean*, 1898; *U. S. Grant, a Biography*, 1900; *The Jimmy John Boss*, 1900; *The Virginian*, 1902, which enjoyed immense popularity; *Philosophy Four*, 1903; *Journey in Search of Christmas*, 1904; *Lady Baltimore*, 1906; *The Simple Spelling-Bee and Mother*, 1907; *The Seven Ages of Washington*, 1908; *Pentecost of Calamity*, 1915, a book about the World War; *Neighbors Henceforth*, 1922; and *Watch Your Thirst*, 1923. He also contributed to Whitney's *American Sportsmen's Library*.

Witch'craft', a supernatural influence, once thought to be acquired by certain persons by reason of some league with Satan or other evil spirits. Until the 16th century, belief in witchcraft was universal, and the law of all Christian countries recognized it as a crime. Roger Bacon, Sir Matthew Hale, Blackstone, Richard Baxter and John Wesley believed in witches. Though this old delusion was beginning to wane at the opening of the 18th century, a local frenzy broke out in New England just about that time. It began and endured mainly about Salem Village (Danvers), and, fanned by the utterances of Cotton Mather (See MATHER, COTTON), it caused a special court to be constituted to try those suspected of witchery, of whom there were over 100 in jail at one time. This court, in 1692, caused the death of 20 victims. With this tragedy, reaction set in, and over 150 persons charged with the same crime were delivered from prison the following year.

Witch'-Ha''zel, a tall shrub of the Witch-Hazel Family, often found growing in damp woods, beside streams and in low marshy fields. Its method of growth gives it a peculiar form, for the branches are apt to recurve at the

ends. The leaves are oval with wavy margins and are much like those of the ordinary hazel, to which, however, this shrub is not at all related. The leaves are almost ready to fall and turn a pale brown color before the flowers appear. These flowers are yellow and occur in small clusters in the joints of the leaves, blooming in the late summer or early autumn. The calyx is four-lobed and there are four long petals. The fruit is a pod containing edible seeds.

The witch-hazel derives its name from the magic powers its branches were supposed to possess. A forked branch was used as a divining rod for the discovery of the presence of metals or of water underground. It was also often used as the marked twig in the casting of lots because it was supposed to have the magic power of attracting the hand of the person to whom the marked lot should go. At present its chief use is in the production of the liquid witch-hazel, a medicine obtained by distilling the leaves and used to heal wounds, bruises and lameness.

Witch-hazel grows in America from Nova Scotia to the Gulf of Mexico and as far west as Minnesota; it is locally known as snapping hazel, striped or spotted alder, winter-bloom and tobacco wood.

Witenagemot, *Wit' e na ge mote'*, the name of the old Anglo-Saxon supreme council. It consisted of the king, the bishops and archbishops, the ealdormen and underlords, or thanes. The council had power to elect and in some cases to depose the king, to make treaties, collect revenues and advise as to declaring war or peace. The Witenagemot was abolished at the Norman Conquest. There is a difference of opinion among historians as to whether or not it constituted the foundation upon which the present Parliament was built.

Wit'ness, in law, one who gives testimony under oath in a judicial proceeding or one who signs his name to a document, thereby acknowledging its validity. A person when summoned as a witness must appear at the time and place

cited in the summons, which in law is known as a *subpœna*. Failure to obey may subject him to contempt, fine or a suit for damages by the party in whose interest he was summoned. If so ordered he must bring with him any books or other documents wanted as evidence and named in the *subpœna*. See EVIDENCE.

Witte, Vit' e, Serge Julievich, COUNT (1849-1915), a Russian statesman. He was placed in charge of the transportation of troops on the Odessa Railroad during the Russo-Turkish War, and later he became general manager of the South-western Railroad. As minister of finance in 1893, he made several commercial treaties with Germany and established the gold standard. This policy aroused the wealthy bankers against him and in 1903 he was removed and appointed president of the committee of ministers. In 1905 he was the chief plenipotentiary of Russia in the conference at Portsmouth, N. H., which resulted in a treaty that ended the war between Russia and Japan. In October, of the same year, he became premier, but resigned in May, 1906.

Woad, Wode, or Dyers' Weed, a European and Asiatic herb belonging to the Mustard Family. It is an annual plant chiefly of interest because its leaves were once used in the manufacture of a blue dye. With the discovery of the usefulness of indigo as a source of dye, the cultivation of woad declined. The leaves of the woad were dried and sold in that form, or reduced to powder and then mixed into a paste. Cæsar speaks of the dye as being used for a body paint by the early Britons. English wild woad produces a yellow dye which is, however, little used. The name woad means weed.

Woburn, Woo' burn, Mass., a city of Middlesex Co., 10 m. n.w. of Boston, on the Boston & Maine Railroad. The city is situated 5 m. from tidewater. It is attractively laid out, with broad streets, and has numerous handsome residences. There is a fine public library, with a valuable art collection. The in-

dustrial interests are confined chiefly to the manufacture of leather. There are, in addition, manufactories of machinery, foundry products, glue, sandpaper, belt knives, etc. Large chemical works are situated at North Woburn. Woburn was settled in 1640 and named Charleston Village. It was incorporated as a town in 1642 and made a city in 1888. Pop., 1920, 16,565; State census, 1925, 18,354.

Wolf, one of the wild and often ferocious members of the Dog Family, found in cool or cold regions along the boundaries of civilization. The common European wolf has entirely disappeared from England but it is still known in northern Europe; it is closely related to the American gray wolf, or timber wolf. Both have coarse gray or yellowish hair, under which is a growth of soft slate-colored fur. The ears are erect, the nose pointed, the legs long and strong and the tail very bushy and heavy. In character the wolf is crafty but generally cowardly, and its endurance allows it to overcome many animals whose speed is far greater than its own.

In summer the wolf is an indolent beast, making its home and rearing its family in a hillside den, where the woodland animals furnish it a satisfactory and plentiful diet. In winter, however, food becomes scarce and the wolves collect in packs to hunt larger animals than could be attacked singly. It is then that the wolf becomes reckless and ferocious and the pack does not hesitate to enter frontier villages, carry off live stock or even children, and attack belated travelers. Its rapacity has probably been overrated because of its terrible howling, its extreme persistence and its boldness when urged by hunger. Because of their depredations and because of the bounty paid for them by the United States Government, wolves are fast being exterminated. Occasionally, however, a pair of timber wolves may be heard howling through the winter nights, or their tracks may be seen across the snowy fields near Northern villages or pioneer homes.

Aside from the gray wolf, the other species of wolf found upon this continent

are the black wolf of Florida and the white wolf of Arctic regions. The Tasmanian wolf is a member of the Dasyure Family of Marsupials.

Wolfe, Woolf, James (1727-1759), an English general, the hero of Quebec, born at Westerham, Kent. At the age of 14 he became an ensign in the army and the following year went to the Rhine campaign, where he so distinguished himself as to be commissioned lieutenant. Later, for his services at Laffeld, in Flanders, he was publicly thanked by the Duke of Cumberland. Having served in Scotland and as a staff officer in the Rochefort expedition, Wolfe came to America in 1758 as brigadier-general under Amherst in the expedition against Cape Breton. He advised and led the attack on Quebec, displaying great courage and genius, and crowning his career by a decisive victory, Sept. 13, 1759, which lost Canada to the French. Early in the engagement he was hit in the wrist, but he did not fall till a third shot lodged in his breast. His last words, when told of the retreat of the enemy, were, "Now, God be praised; I shall die happy!" In Westminster Abbey and on the battleground on the Heights of Abraham there are memorials to Wolfe, while in the governor's garden, Quebec, there is a monument to Wolfe and Montcalm, the French commander. See QUEBEC, BATTLE OF.

Wolsey, Wool' zy, Thomas (about 1475-1530), an English cardinal and statesman, born at Ipswich and said to have been the son of a butcher. He was educated at Magdalen College, Oxford, receiving his B.A. when only 15 years of age, and later served as master in the same place. Ordained as priest in 1498, his ecclesiastical preferments culminated in his appointment by Henry VIII to the deanery of Lincoln in 1509. Royal favor continued to add a half-dozen preferments, until in 1511 he was appointed privy councilor and secured a controlling voice in the government. Of a warlike nature, he urged campaigns to Biscay and France, but brought about peace finally in the union of Mary Tu-

dor and Louis XII. He received successively the bishoprics of Lincoln and Tournai, the archbishopric of York and finally the cardinalate in May, 1514. He was candidate for the Papacy in 1521 and 1524, and his power in England and his revenues were only equaled by those of the Crown. The war between France and Netherlands gave Wolsey an opportunity to appear as arbiter for a time, but at the close of the war in 1529 the position of England was not as strong as at the beginning of Wolsey's power, and this reacted on his position in England. Although he had developed the Star Chamber, repressed feudal jurisdiction and maintained justice and order, thus benefiting his own country greatly, his failure to secure a divorce for Henry VIII from Catharine of Aragon resulted in his fall, and he gave up all his preferments except the archbishopric of York. Upon being summoned to London on a charge of treason, he started, but died at Leicester Abbey on the way and was buried there. Although his greed and arrogance were colossal, his love of work, administrative capacity and diplomacy made him a man with few rivals.

Wolverine, Wool' ver een', or Glut'-ton, a shaggy, flesh-eating animal of the Weasel Family and allied to the sables and martens. It inhabits northern Europe and Asia, and northern North America, rarely being seen in the United States. It is a heavily-built animal, with pointed muzzle, small ears and a rounding skull. Its feet are flat-soled and armed with strong claws; the tail is short but bushy. Trappers' legends give the wolverine credit for great skill and malicious cunning, and horrible stories are told of its disgusting rapacity and ferocity. The truth, however, seems to be that the wolverine is particularly clever in avoiding traps and sagacious in obtaining food in times of scarcity. The fur of the wolverine is dark brown or almost black, sometimes having paler or white markings. The name glutton is applied to the wolverine in England and European countries.

Woman's Christian Temperance Union, a national organization of women interested in the suppression of the liquor traffic. It was organized in Cleveland, Ohio, in 1874, and its headquarters are now at Evanston and Chicago, Ill. Local societies, as well as county, district and state organizations, are found in every state in the Union. Through its influence women and children in large cities receive protection in houses of refuge and industrial schools. It has secured legislation requiring instruction in the effects of narcotics and stimulants on the human system in the public schools of nearly every state in the Union. A world organization was established through the efforts of Frances E. Willard. Their badge is the white ribbon and their official organ the *Union Signal*. See WILLARD, FRANCES ELIZABETH.

Woman's Relief Corps, *Kore*, a patriotic society organized in 1883 as an auxiliary to the Grand Army of the Republic. All loyal women are eligible to membership, but the wives, mothers and daughters of members of the Grand Army of the Republic constitute the bulk of the membership. The purposes of the society are to perpetuate the memory of the Union soldiers of the Civil War, to promote patriotism and to lend assistance to widows and orphans of the order. There are about 165,000 members.

Woman Suffrage. On the 26th day of August, 1920, Secretary of State Colby having announced that the legislatures of the necessary thirty-six states had ratified the 19th Amendment to the Constitution granting the full right to suffrage to the women of the United States, it became a part of our law, thus ending a struggle of almost a century's duration. The position of women was discussed by Plato and Paul, in the Middle Ages and on through the centuries, but the movement for their enfranchisement made little headway until the 19th century. The first woman suffrage convention, among the leaders of which were Elizabeth Cady Stanton and Lucretia Mott, was called in Seneca Falls, N. Y., July 19, 1848, and subsequent conven-

tions were held until the Civil War. In 1869 two national associations were formed, and in 1890 these were united into the National Woman's Suffrage Association, with Susan B. Anthony as active president. It was about this time that the leaders of the movement in America began to cooperate with those in other countries, and by 1902 an International Committee was formed, in Washington, with representatives from five countries. In 1904 the International Woman Suffrage Alliance was formed, and in 1911 it met in Stockholm, with delegates from national organizations in the 24 countries where the equal suffrage movement has taken definite form.

In the United States women had been completely enfranchised in Wyoming, Colorado, Utah, Idaho, Washington, California, Kansas, Oregon, Arizona, Nevada and Montana, and partially so in Illinois, Louisiana, Iowa, Delaware, Montana and Michigan and in the villages and several third-class cities in New York; and in over half the states they have had school suffrage. In the presidential election of 1912 three women were chosen to an office never before held by members of their sex—that of presidential elector. In England, women had been eligible for school boards since 1870, since 1888 they had had the county franchise, and since 1894 had been eligible for parish and district councils and for certain boards and commissions. In 1907 they were made eligible as mayors and county and city councilors. The women of Scotland received the municipal franchise in 1881, and those of Ireland in 1898. In the Isle of Man women property-owners have had the full suffrage since 1881, women rent-payers, since 1892.

Among the English colonies, New Zealand has completely enfranchised the women, being the first country in the world to do so; equal suffrage prevails in all the states of Australia; in the provinces of Canada a portion of the women have the school or municipal suffrage; and in some of the cities in India women property-owners may vote in municipal

affairs. The equal suffrage movement has made great progress in Sweden, where limited suffrage has long prevailed. In 1909, women voted for the first time in Denmark at the municipal elections. In 1911, Iceland gave Parliamentary suffrage to women over 25 years of age. In Norway and Finland women are completely enfranchised, and in Prussian Silesia women landowners may vote by proxy for members of the board of trade and serve as members themselves. The movement has spread also to such countries as Persia, Siam, China and Mexico.

Like all other progressive movements, that for woman suffrage has called forth strenuous opposition, and among the strongest "antis" women themselves are numbered. The chief arguments are here summarized. Advocates of woman suffrage say that in granting the franchise discrimination on the basis of sex is illogical and unfair; that the right to vote is a natural one; that women are citizens in all respects except voting, and that they deserve and need the protection of the ballot as much as men; also that women property-owners have the same cause for protest as did our forefathers when they declared that "taxation without representation is tyranny." They say further that enfranchisement will raise the economic, social and intellectual position of woman by protecting her interests, giving her equality in the home and stimulating her education along political lines; that suffrage will benefit the government by the addition of a body of voters generally admitted to be more sensitive to moral issues than men; that an increasingly large number of women are asking for the ballot; and that wherever woman suffrage has been tried it has been found practicable and beneficial.

The opponents of the movement say that suffrage is not a natural right but a privilege conferred from considerations of expediency; that in the progress of the race there has been a division of labor whereby men have assumed certain duties and women others, and that

voting is one of the essential duties connected with man's work in life; that woman's interests are now so safeguarded her enfranchisement for her own protection is unnecessary; that taxation and voting have no essential connection, and women property-owners are no more subject to injustice than are men of the army and navy who own property. They say further that equal suffrage is prejudicial to the interests of the State because it gives the ballot to those unfit for voting, physically, by temperament and through lack of training; that voting will interfere with woman's work as a homemaker and thus work harm to society; and that the majority of women do not wish to vote and that it is not fair to add to their duties one which they are unwilling to assume.

Wom'bat, a small Marsupial of the Phalanger Family, found in Australia. The wombats live in burrows or caves, where they sleep by day and from which they issue by night and feed upon young leaves, roots and vegetables. They have broad, furry bodies, short ears, powerful incisor teeth and only the rudiments of tails. They are usually gentle but defend themselves with their sharp teeth. Their walk is a shuffling imitation of the gait of the bear. The fur of the wombat is of commercial value and the flesh is enjoyed by the Australians.

Women, Colleges for. Higher education for women has made more rapid advancement in the United States than in any other country. Emma Willard and Mary Lyon were pioneers in this work, and Mt. Holyoke Seminary, established by Miss Lyon and opened in 1837, was the first institution in the country devoted to the higher education of women. At first the movement grew slowly and met with much opposition. However, public sentiment in favor of equal education for young men and young women steadily increased, and in response to the demand state universities and other colleges became coeducational. Great colleges for women were also established, until at the beginning of the 20th century educational oppor-

WOMEN, COLLEGES FOR

WOMEN, COLLEGES FOR

tunities for the sexes were about equal. The table below shows locations and dates of opening of the leading women's colleges of the United States. Some of the more widely known are treated in detail. For Barnard and Newcomb see, respectively, COLUMBIA UNIVERSITY and TULANE UNIVERSITY.

BYRN MAWR COLLEGE, at Bryn Mawr, near Philadelphia, was founded by Joseph W. Taylor and incorporated in 1880. It offers degrees of B.A., M.A., and Ph.D., and its methods and courses are based on the university model. A department of music and a summer school for women industrial workers were opened in 1921. Enrollment about 500.

RADCLIFFE COLLEGE, in Cambridge, Mass., was founded in 1897 as the Society for the Collegiate Instruction of Women. In 1894 it received its present name in honor of Anne Radcliffe, a benefactor of Harvard. Courses are in general given by members of the Har-

vard faculty; requirements for admission and degrees are the same as those of Harvard, but the institutions are not officially affiliated.

courses are open to teachers. The enrollment is about 950.

SIMMONS COLLEGE, at Boston, Mass., was founded in 1899 according to the requirements of a large bequest by John Simmons. It has courses in home economics, secretarial work, library science, general science, social work, industrial teaching, store service, and public health nursing. The enrollment averages about 1,200.

SMITH COLLEGE, at Northampton, Mass., was founded in 1871 by Sophia Smith, of Hatfield, Mass. The undergraduate course leads to the degree of A.B., while the degree of M.A. is conferred for graduate work. In 1918 a

College	Location	Opened
Bryn Mawr College	Bryn Mawr, Pa.	1885
Connecticut College for Women	New London, Conn.	1912
Elmira College	Elmira, N. Y.	1855
Florida State College	Tallahassee, Fla.	1905
Goucher College	Baltimore, Md.	1888
Hunter College	New York, N. Y.	1870
Lake Erie College	Painesville, Ohio	1859
Mills College	Mills College, Calif.	1871
Milwaukee-Downer College	Milwaukee, Wis.	1895
Mt. Holyoke College	South Hadley, Mass.	1837
Oklahoma College for Women	Chickasha, Okla.	1908
Radcliffe College	Cambridge, Mass.	1897
Randolph-Macon Woman's College	Lynchburg, Va.	1893
Rockford College	Rockford, Ill.	1849
Simmons College	Boston, Mass.	1902
Smith College	Northampton, Mass.	1875
Sweet Briar College	Sweet Briar, Va.	1901
Vassar College	Poughkeepsie, N. Y.	1865
Wellesley College	Wellesley, Mass.	1875
Wells College	Aurora, N. Y.	1868
Western College for Women	Oxford, Ohio	1853

vard faculty; requirements for admission and degrees are the same as those of Harvard, but the institutions are not officially affiliated.

MT. HOLYOKE COLLEGE, at South Hadley, Mass., one of the oldest institutions in America for the education of women, was founded by Mary Lyon (See LYON, MARY) and was opened in 1837 as a seminary. It became a college in 1888. It offers the degree of B.A. Provision is made for graduate work, and special

School of Social Work was established, and in 1921 an Experimental School for the Training of Teachers of Retarded Children. The enrollment averages about 2,200.

VASSAR COLLEGE, at Poughkeepsie, N. Y., was founded by Matthew Vassar in 1861 as Vassar Female College. The present name was adopted in 1867. The course of study leads to the degrees of B.A. and M.A. The student enrollment is limited by a resolution of the board of

trustees to 1,000, but the pressure for admission and the difficulty of gauging withdrawals make it impossible to maintain this limit of exactness.

WELLESLEY COLLEGE, at Wellesley, Mass., was founded in 1875 by Henry Fowle Durant. Courses lead to the degrees of B.A. and M.A. The college is a contributor to the American schools of classical study at Rome and Athens, to the Marine Biological Laboratory at Woods Hole, Mass., and to the Zoological Station at Naples. The average enrollment is about 1,650.

WELLS COLLEGE, at Aurora, N. Y., was founded as a seminary in 1868 by Henry Wells. It became a college in 1870. The courses lead to the degrees of B.A., M.A., and B.Mus. The number of students, which is limited, averages about 200.

Women's Clubs, general organizations maintained by women for their own interests. They are a natural outgrowth of woman's increasing interest and share in public activities. Originally women began to cooperate and organize for charitable and religious purposes, but their work soon extended into other lines, and it now falls into educational, practical and social lines of activity. Some of the most important legal measures for the improvement of conditions among the working women and the restriction of child labor have been brought about through the efforts of women's clubs. In 1890 the General Federation of Women's Clubs was formed. Biennial meetings are held by the federation, and its membership exceeds 200,000. Religious and political interests are waived and the work is restricted to social activity, and artistic, literary and scientific pursuits. In England, Australia and New Zealand the clubs have agitated women's rights, especially the rights of suffrage and of holding public office.

Wood, Leonard (1860-1927), an American soldier, born in Winchester, N. H. He received his doctor's degree from Harvard in 1884, entering the army as assistant surgeon and serving against the Apaches in 1886. At the outbreak of the Spanish-American War he aided

Roosevelt in recruiting the Rough Riders. He was commissioned brigadier-general for his services at Las Guasimas and San Juan, and five months later, in December, 1898, he became major-general of volunteers. Subsequently he was military governor of Cuba for three years, in which capacity he effected many sanitary improvements, was appointed major-general in the regular army and made governor of Moro Province, in the Philippines, commanded in turn the Philippines Division and the Department of the East and, in 1910, was special ambassador to Argentina. In July of that year he became chief of staff. During the World War he was in charge of training camps. In 1921 he retired from the army to become governor-general of the Philippine Islands.

Wood'chuck", an active American Rodent of the Squirrel Family, represented in the Old World by the marmot and known in southern United States as the groundhog. It has long, coarse fur which is grayish above and rusty red below; the size of the woodchuck is about that of the house cat, but its legs are shorter though very strong. The forefeet are fitted with sharp claws with which it digs its burrow; the dirt is thrown out with the forefeet and scraped back with the hind ones until a large, many-roomed excavation is formed. The woodchuck upon issuing from home, pauses for a reconnoitre before his door, seating himself upon his haunches and looking about him with sharp, inquisitive eyes and attentive ears. If danger is near he dives back into his burrow, giving two or three short, screaming whistles; but if he perceives no danger he bounds off to the red clover field, his favorite haunt, or to the farmer's growing crops, where he can do great damage while delighting himself with green vegetables. Unable to find food during the winter, the woodchuck hibernates, and there is a superstition that if the woodchuck comes out on Candlemas Day and sees his shadow, he will return to sleep, knowing that the cold will continue for six more weeks.

Wood'cock'', a bird of the Snipe and Plover Family. The American woodcock is about the size of the robin and has a long, slender bill grooved and roughened toward the end. The upper parts are grayish or brownish, thickly mottled with black; the under parts are buff-colored; the throat is dark buff; and the back of the head is black with buff-colored crossbars. The tail is black tipped with white. The nest is built in the open woods, usually near a stream, and is made of leaves and grass. Three or four grayish eggs, spotted with light red, are laid. The woodcock is usually an inhabitant of swampy woodland where it will bore into the ground for worms with its long bill. It ranges throughout eastern North America.

Wood Duck, or Summer Duck, a bird of the Duck and Goose Family. The handsome male wood duck is about 20 inches long; the head and large crest are purple and green with white stripes; the upper parts are black with rich iridescent colors; the sides gray, with bars of black and white, which also mark the shoulders; the crest is chestnut, marked with white triangles; the throat is white and the bill is marked with yellow, red, black and white. In the female the head is grayish with a greenish gloss; the sides of the throat and head are white; the crest is brown; the under parts are white; and the back is grayish-brown. The nest is made in a natural cavity of a tree 30 or 40 ft. from the ground, and lined with down. The eggs, usually 14, are creamy white. The wood duck is a common inhabitant of temperate North America, where its natural habitat is a marshy pond or creek well hidden in the forest.

Wood'en Horse, in classic mythology, the huge hollow horse in which were concealed a number of Greek warriors. As the Greeks had been unsuccessful during ten years in openly gaining an entrance into Troy, they determined on strategy, to the end that the hollow horse was constructed and artfully left near the city gates. A plausible Greek persuaded the Trojans to receive the horse and offer it to Neptune. The first

night the horse was within the city, the concealed soldiers crept from it and admitted the Greek army into Troy, which was then sacked and burned.

Wood'men of America, Modern, a fraternal insurance order organized in Iowa in 1883 and chartered under the laws of Illinois the following year. The local organizations are called camps. The membership increased rapidly and camps are now found throughout the country. The membership exceeds 1,130,000. In 1912 the rates of insurance or dues were raised and this caused considerable dissension among the members, but a perpetual injunction against these new rates was obtained.

Woodmen of the World, The, a fraternal insurance order organized in Nebraska in 1890. The controlling body is the Sovereign Camp of the World. The local branches are called camps. Membership is confined to white men, and there is a woman's circle affiliated with the order. The order pays old-age benefits and erects monuments over the graves of deceased members. The membership exceeds 500,000.

Wood'peck'er Family. The Woodpeckers constitute a peculiar group of birds distinguished by the structure of the toes, two in front and two behind, which enables them to cling vertically to the trunks of trees, supported by the heavy, bristly tail; and also by the chisel-shaped bill and long, barbed tongue. They are of great value to the agriculturalist because of their habit of digging into the trees for the larvæ of wood-boring insects. It has been asserted that the woodpecker is able to hear the insect at work under the bark. The woodpecker progresses up a tree by a succession of jerks; often it will back down a tree or perhaps work its way around in its search for insects. Some woodpeckers dart from the trunks after insects in the same manner as do the flycatchers. The nest is hollowed out of the trunk of the tree by the chisel-like bill, and is lined with chips. The eggs vary in number in the different species, sets running from four to nine.

There are upwards of 35 different kinds of American woodpeckers, which vary in size from the tiny downy, six inches long, to the great ivory-bill, which measures nearly two feet (20 inches) in length. All are more or less strikingly colored.

RED-HEADED WOODPECKER. This is perhaps the most distinctly marked, its bright red head and black and white body making its identification easy.

HAIRY WOODPECKER. This bird is common in the eastern part of the United States. It is about the size of the robin; the upper parts are black, the under parts white, the wings have white bars across them and there is a white space in the middle of the back. The outer tail feathers are pure white, and in the male there is a scarlet patch at the back of the head.

CALIFORNIA WOODPECKER. This bird is noted for its habit of storing up acorns in trees and telegraph poles, drilling holes in these objects and driving the acorns into the cavities. These birds are about the size of the robin, and may be known by the red crown, the white or yellow band on throat and forehead, the greenish upper parts and chest band, the white wing patch and belly, and the bluish-black, white-streaked chest.

Wood Sorrel, or Ox'alis, a delicate woodland plant of the Geranium Family, growing in moist situations by forest roadsides or in shady dells. It is much like clover in appearance, having slender stems and delicate leaves of three leaflets. In color these leaves are lighter than the clover and have no white lines nor silky hairs. The apexes of the leaflets of the wood sorrel are deeply notched and each half of the leaf drops slightly downward from the midrib; under the influence of the hot sun or at night these halves close and fold down the leaf stem. The flowers are regular, pink, white, yellow, magenta or violet-marked blossoms having five sepals, five petals, five stamens and five divisions at the apex of the pistil. A stemmed wood sorrel is also known in the fields of the United States and Canada. All

of these species are frequently called oxalis because of the oxalic acid contained in the stem and leaves. The house plant, oxalis, is a member of the same genus.

Wood'stock, a town of Canada in the Province of Ontario, capital of Oxford Co., situated on Cedar Creek, on the Thames River and on the Canadian National and the Canadian Pacific railways, 30 m. e. n.e. of London. A residential school, affiliated with McMaster University, Toronto, is controlled by the Baptist Church. Farm produce, cheese and butter are exported; the manufactures include organs, pianos, automobiles, farm implements, furniture and leather. Population, 9,935.

Wood'ward, Calvin Milton (1837-1912), an American educator, born in Fitchburg, Mass., and educated at Harvard. He was early associated with the Brown High School, Newburyport, Mass., and the Smith Academy, St. Louis. In 1871 he became professor of mathematics and applied mechanics at Washington University, in 1901, dean of the school of engineering and architecture, and, in 1909, professor emeritus. Meanwhile, in 1879, he organized the St. Louis Manual Training School, of which he then became director. This was the first school of its kind in the United States. See **MANUAL TRAINING**.

Woodward, Robert Simpson (1849-1924), an American scientist, born in Rochester, Mich., and educated at the University of Michigan. He was early associated with the United States Lake Survey, with the Transit of Venus Commission, the Geological Survey and the Coast and Geodetic Survey, and in 1893 he became professor of mechanics and mathematical physics and, later, dean of the school of pure science, Columbia University. From 1905 to 1920 he was president of the Carnegie Institution of Washington.

Wool. See **SHEEP**.

Wool, Manufacture of. So far as known, wool is the oldest fiber used in the manufacture of clothing. The Greeks are supposed to have learned the

art of making woollen cloth from the Egyptians. The Greeks passed the art on to the Romans, by whom it was introduced into Britain and other countries of Europe. Until modern times all processes were performed by hand labor and with simple machinery. Later inventions have merely enlarged and improved the simple machines of early times and applied water and steam power to their operation. When the wool reaches the factory, it is first stapled or sorted. During this process much of the loose dirt is separated from the fiber. The second process is scouring, which consists in passing the wool through a vat or a series of vats containing a hot soapy solution, by means of which the wool is thoroughly cleansed. It then passes to the drying frame, where it is dried. If colored cloth is desired, the wool is dyed before drying. When dry, it passes to the teasing machine, where the fiber is separated and all knots are removed. If the wool contains burs, these are extracted by a special machine.

The wool then passes to the carding machines, which are usually three in number and known respectively as the scribbler, the intermediate and the finisher. The carding machine consists of a series of rollers studded with fine teeth and rotating in opposite directions. As the wool passes through the carding machines, the fibers are pressed together and arranged parallel to each other. When it leaves the finisher, the wool is in the form of a large strand, or yarn, which is wound on bobbins ready for the spinning frame. Spinning is done on the wool-spinning mule, which produces a large number of threads at once. See SPINNING.

By means of the looms of various patterns, a great variety of woollen fabrics can be produced (See WEAVING). After weaving, the cloth is washed to cleanse it from oil and other impurities. It is then scoured with water mixed with fuller's earth, after which it undergoes the process of teasing and shearing. The first raises the nap and the second finishes the surface.

Woolens are usually placed on the market in "bolts," which are bundles containing 50 yards. The woollen industry in the United States is one of importance, and the value of the annual output of all mills exceeds \$200,000,000. Woolen mills are quite generally distributed, but Massachusetts, Pennsylvania, Maine and New York are the leading states in the production of woolens.

Wool'sey, Theodore Dwight (1801-1889), an American educator and author, born in New York City and educated at Yale. Later he studied law at Philadelphia for one year; theology at Princeton for two years; and, after a brief tutorship at Yale, pursued courses at Leipsic, Bonn and Berlin. From 1831 to 1846 he was professor of Greek at Yale; then, for a quarter of a century, president of the institution; and, during the succeeding decade, chairman of the American commission on revision of the Authorized Version of the Bible. Dr. Woolsey was a descendant of Jonathar Edwards and a nephew of Timothy Dwight. The breadth and accuracy of his scholarship and his high ideals and sterling character enabled him to strengthen materially the resources and the already high reputation of his alma mater. His works include *Communism and Socialism, Political Science, Introduction to the Study of International Law and Religion of the Present and Future*, collected sermons.

Wool Sorter's Disease, a kind of blood poisoning brought on by handling wool, mohair, alpaca or similar animal furs, and which sometimes ends fatally. The disease is due to a bacillus called anthrax. The germ may be present in the dust of the wool and enter the lungs through the air passages or through a wound in the skin. It is possible to disinfect the wool by baking in a hot oven for several hours or by the use of certain chemicals, and thereby prevent infection. Immunity may be secured also by inoculation with a specific virus, with toxins or with antitoxic serums. See ANTHRAX.

FROM WOOL TO CLOTH



Wool is nature's clothing to protect the sheep against cold weather.



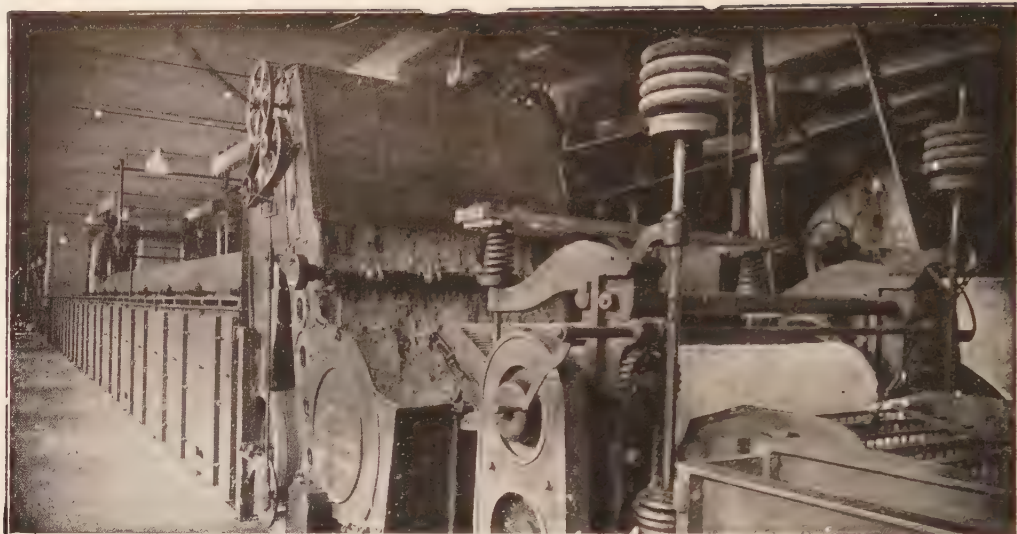
When a skillful shearer removes the fleece the wool sticks together and the whole fleece may be spread out like the skin of an animal.

Photograph, courtesy Chicago Flexible Shaft Company.



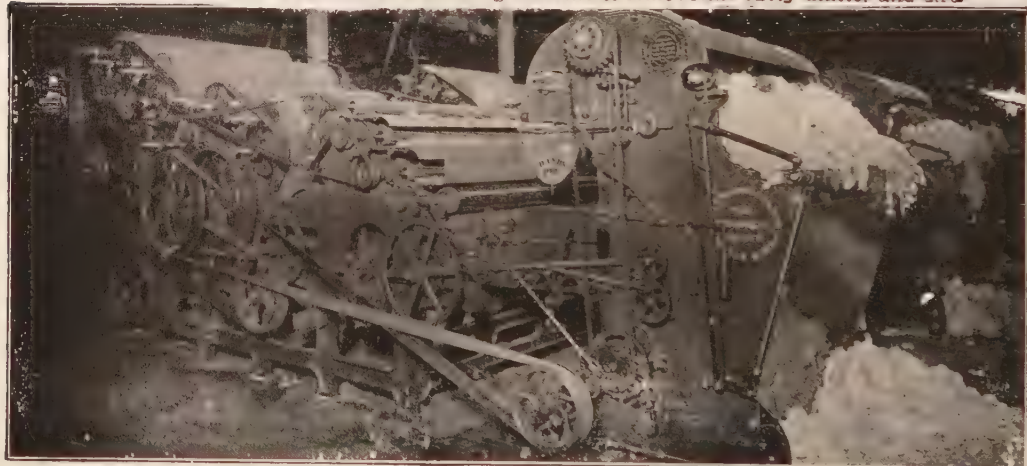
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The fleeces are spread on a table and sorted, different parts being separated according to the different qualities.



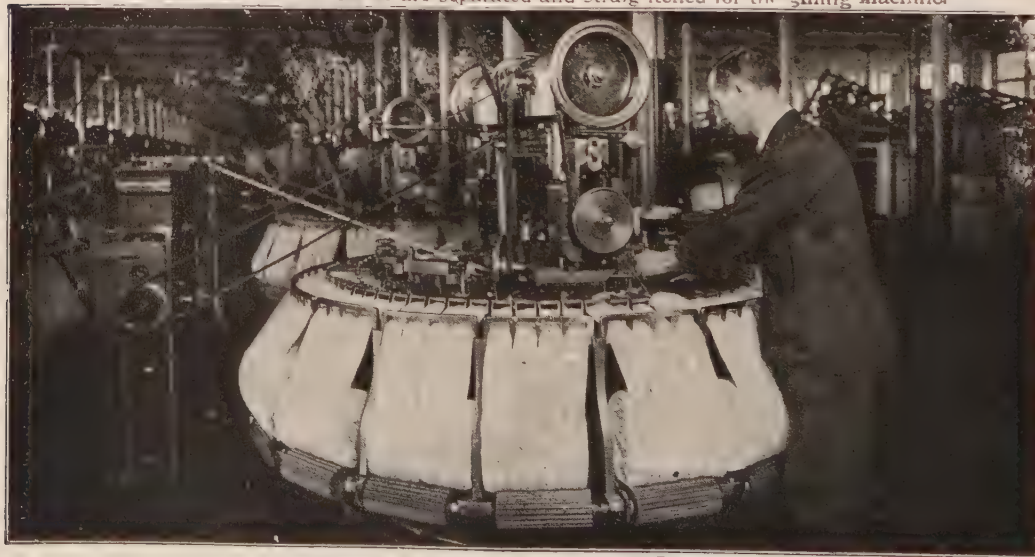
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The wool is cleansed or scoured in a washing machine to remove the fatty matter and dirt.



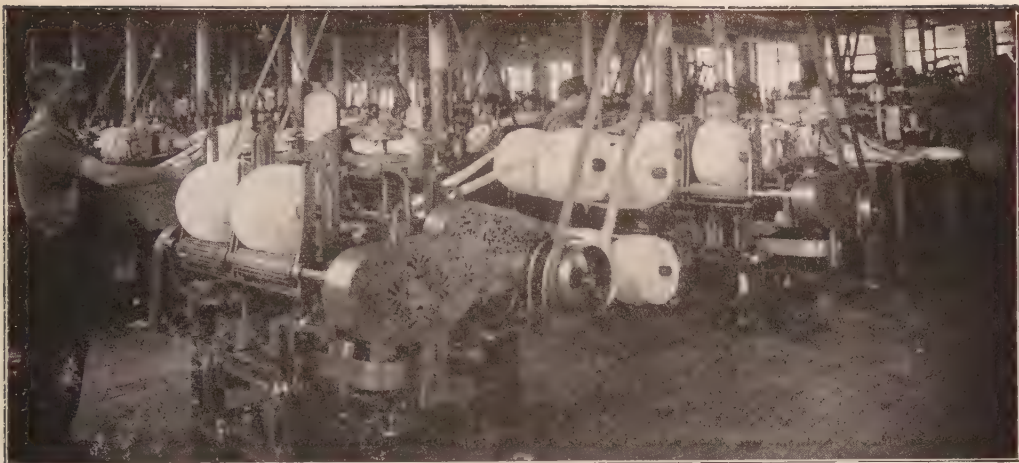
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In the carding room the fibers are separated and straightened for the gilling machine.



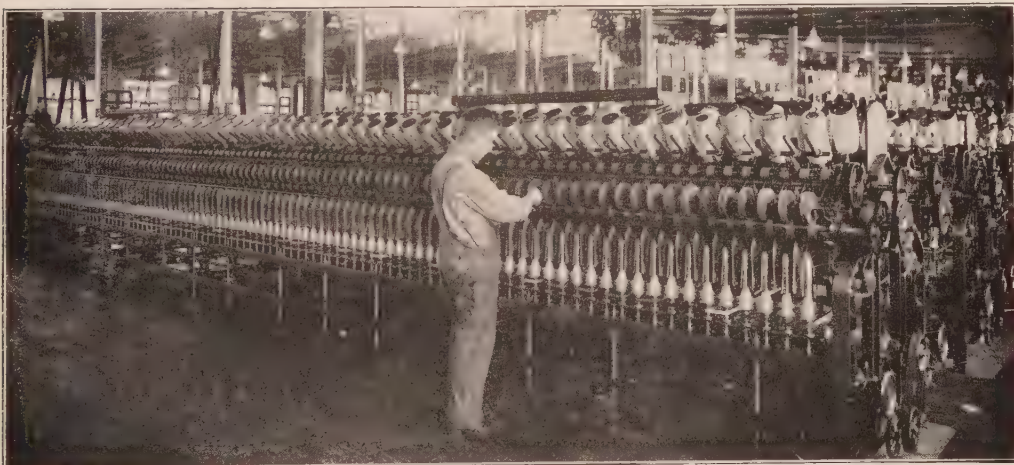
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From the gilling machine the wool comes off in soft strands.



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When the wool sliver comes from the combs most of the fibers are parallel to each other. A number of the slivers are then put through two further operations of gilling, and wound into a large ball.



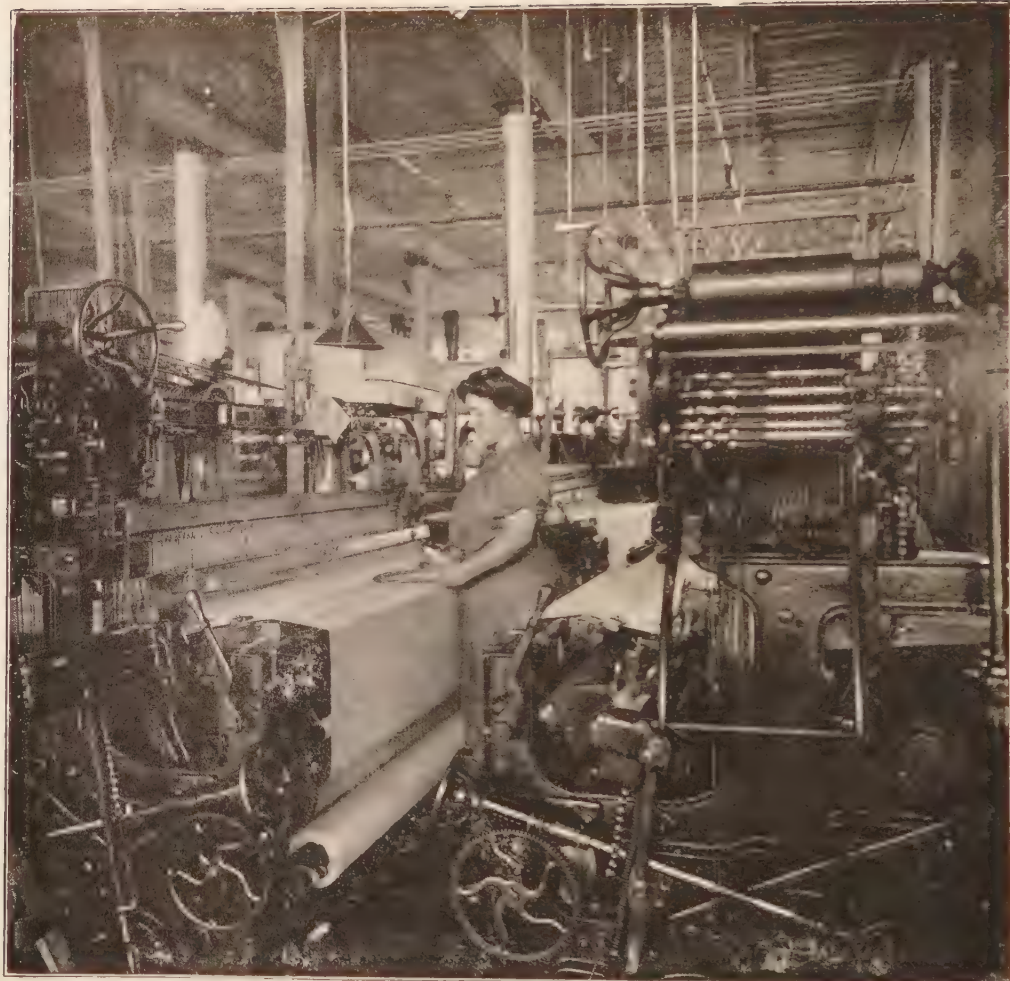
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The untwisted wool is run through the drawing machine (nine distinct operations) and then delivered to the spinning room, where the drawing continues until the twisted thread is the size required.



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The threads must be prepared for the loom in order that the actual weaving may be done



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The thread is used in two ways in weaving—as warp, which is the thread which runs lengthwise of the cloth, and as filling, or woof, which runs across the cloth from side to side. The warp threads—the threads which run lengthwise of the cloth—are sized and wound upon large reels, and from these transferred to a large wooden roll called the warp beam, which holds all the warp threads, usually several thousands. The filling threads are put on shuttle bobbins and placed in the shuttles to be refilled by the operatives as required, and as the weaving progresses.



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The web or cloth is scoured or washed and the oil and any foreign matter removed. Undressed fabrics are run through a fulling machine where, moistened with a specially prepared soap, they are subjected to a great pressure and pounding, which aids in giving the required finish.

Woonsocket, R. I., a manufacturing city of Providence County, 15 miles northwest of Providence and 38 miles southwest of Boston, at the northern boundary of the state, on the Blackstone River and on the New York, New Haven & Hartford Railroad. The falls of the river furnish ample water power for the city's many industries. Woonsocket is well known for its extensive manufactures of woolen and worsted yarns and goods. The yarns are made by the French, Belgian, and Bradford processes. Cotton yarns are also produced in large quantities, and likewise cotton, plush, and corduroy piece goods. Among the other products of the city's factories are silks, satins, underwear, bathing suits, handkerchiefs, woven narrow fabrics, textile machinery and other textile-mill supplies, rubber shoes, washing wringers, rubber rolls, automobile accessories, awnings, brushes, soap, castings, cabinet work, sheet metal products, and transmission machinery. Woonsocket is the seat of Mount St. Charles College (men, Roman Catholic). The place was founded in 1666 by Richard Arnold, who about that time built a saw-mill on the bank of the Blackstone River. The name is of Indian origin, *woon* meaning "thunder" and *socket* meaning "mist." The city was incorporated in 1888. Population, 51,100.

Worcester, Woos'ter, Joseph Emerson (1784-1865), an eminent American scholar, author of *Worcester's Dictionary of the English Language*. He was born at Bedford, N. H.; grew up on a farm, and, entering Yale in 1809, graduated two years later. After teaching for several years he settled in Cambridge, Mass., in 1819, where he lived until his death. He was a retiring and modest man, and his was a quiet life; yet he was a member of many learned societies, lectured extensively, and in 1830 visited Europe to consult some of the great libraries and to collect philological works. His great dictionary, published in 1860, was the product of many years of painstaking research. It was the first in which

illustrations were employed. In it he sought to represent the English language as actually used.

Worcester, Mass., an industrial city and port and one of the two county seats of Worcester County, 44 miles west of Boston and 44 miles northwest of Providence, on the Blackstone River, a branch of the Providence River, and at the junction of the New York, New Haven & Hartford, the Boston & Albany, and the Boston & Maine railroads. Worcester is the second city in size in the state. It is situated in a valley surrounded by hills and lies about 480 feet above tidewater. Worcester was the first city in the United States to purchase land for park purposes and it also had the first municipal club house in the country. It has a large number of parks and playgrounds, with tennis courts, baseball diamonds, picnic groves, swimming beaches, etc. Many acres of natural park lie along the shores of Lake Quinsigamond, which forms the eastern boundary of the city. At the fair grounds, which have a half-mile trotting track, the New England and Worcester Agricultural Societies have held a fair annually for more than a hundred years.

INSTITUTIONS. Worcester is a noted educational center. It is the seat of Clark University (men, non-sectarian), established in 1887; of Holy Cross College; Worcester Polytechnic Institute, a famous engineering school; Worcester Academy; Assumption College; Massachusetts State Normal School; Worcester Boys' Trade School; Worcester Girls' Trade School; and Bancroft School. The city is famed for its intercollegiate sports. There are more than 100 churches and a number of hospitals, orphanages, and homes for the aged. The Society for District Nursing operates eight public health centers. The Worcester Art Museum, founded by Stephen Salisbury, has an endowment of \$4,000,000 and contains valuable paintings and the Bancroft

collection of Japanese art. The American Antiquarian Society, founded in 1812, is one of the renowned historical bodies of New England. The Historical Society and the Natural History Society are noted for the excellence of their collections. The Worcester Music Festival, held each year, is famed nationally.

INDUSTRIES. Worcester is one of the greatest machine-tool centers in the world and is noted for rolling-mill construction. Other important manufactures include wire goods, grinding wheels, carpets and rugs, leather and leather goods, corsets, shoes, envelopes, woolens, skates, wall paper, vacuum cleaners, valentines, looms, steam and electric cars, automobile parts, firearms, boilers, sprinkler systems, textile machinery, wire-nail machinery, precision gauges, and chains.

HISTORY. The first grant of land was made in 1669 and the place called Quinsigamond Plantation. A permanent settlement was made in 1684 and the name changed to Worcester because a number of the inhabitants had formerly lived in Worcester, England. The town was incorporated in 1780. In the city and its environs have lived George Bancroft, eminent historian; Edward Everett Hale, clergyman and author; Elias Howe, inventor of the sewing machine; Eli Whitney, inventor of the cotton gin; Dr. William T. G. Morton, discoverer of the use of ether as an anaesthetic; Andrew H. Green, "Father of Greater New York"; and Clara Barton, founder of the American Red Cross.

The government is vested in a mayor, elected annually; a board of 11 aldermen—one elected at large and one from each ward; and a board of councilmen, three from each of the 10 wards. These two boards, which constitute the city council, elect the heads of departments and have power to confirm or reject nominations made by the mayor to either board. Population in 1920, U. S. Census, 179,754. Estimated population, 1925, 192,242.

Wor'den, John Lorimer (1818-1897), an American naval officer, born in Westchester County, N. Y. In 1835 he en-

tered the navy as midshipman, in 1846 was made lieutenant, and in 1862 commanded the *Monitor* during its encounter with the *Merrimac*, in Hampton Roads. During the engagement, injuries about the head seriously impaired Worden's eyesight; but he later bombarded Ft. McAllister, destroyed the *Nashville* and was active in an attempt on Charleston. In 1870 he became superintendent of the Annapolis Naval Academy, in 1872 was made rear-admiral and in 1886 was retired. See HAMPTON ROADS, BATTLE OF.

Wordsworth, Wurdz' wurth, William (1770-1850), England's greatest nature poet, born at Cockermouth, in Cumberland. His early school days were passed at Hawkshead, on Esthwaite Water in the Lake region. During this period, which he called the "fair seed-time of his soul," he spent many hours among the hills and valleys of the beautiful country about him. He entered Cambridge University in 1787, and in November, 1791, shortly after his graduation, went to France, then in the throes of the great Revolution. He became an ardent supporter of the Revolutionists, but was obliged to return to England before he could join them. Later, the horrors of the Revolution made him a staunch Conservative. Coming back to England, he turned to literature, and in 1793 published two volumes of poems. These won him no fame, but they led to a deep friendship with Coleridge, who saw in his work the "advent of an original poetic genius." In 1795 Wordsworth settled at Racedown with his sister Dorothy, whose influence meant much to him during this formative period, and in 1797 they removed to Alfoxden, near Nether Stowey, to be near Coleridge.

Wordsworth's companionship with Coleridge marks the real beginning of his poetic career, the first fruits of their union being the *Lyrical Ballads*, which appeared in 1798. This book may be regarded as the definite beginning of the Romantic movement in English literature and as marking the consummation of the revolt against the Pope style of poetry, a revolt that had been gathering head for half a century (See LITERATURE, subhead *English Literature*). The *Lyrical Ballads*, containing one of Wordsworth's finest poems, *Tintern Abbey*, and Coleridge's incomparable *Rime of the Ancient Mariner*, represented two impulses of the new poetry: Wordsworth treated simple, everyday incidents so as to reveal in them

elements of dignity and mystery, while Coleridge treated mysterious subjects in such a way as to make them seem real. The winter following the publication of the *Lyrical Ballads* Wordsworth passed in Germany, producing here some of his typical poems, such as *She Dwelt Among the Untrodden Ways* and *Three Years She Grew In Sun and Shower*. On his return to England he settled with his sister at Grasmere, finally removing to Rydal Mount, his home for 37 years. He was married in 1802. His life in the beautiful Lake country was quiet, fruitful and happy, broken only by occasional trips abroad and visits from men of letters and others who learned to appreciate his genius. In 1843 he was made poet laureate to succeed Southey, for, though his poetry at first met with neglect from the public, before his death in 1850 his fame had been established.

In his *Tintern Abbey*, Wordsworth has revealed the steps in his poetic development: Nature at first was beloved for her external beauty; later, he found that this beauty had the power to heal, gladden and strengthen; lastly, he found in Nature a spirit "that impels all thinking things, all objects of all thoughts, and rolls through all things." These three themes, in which he reveals himself as the realist, moralist and mystic, were developed or blended in many great poems. The first of England's nature poets, he depicts natural beauties simply, reverently and faithfully, and in the same reverent spirit treats of the everyday emotions and duties of the ordinary man and woman. "He is the poet of human life in its lowest terms," possessing the power of giving to the joys and sorrows of the peasant a genuine dignity and impressiveness. Wordsworth's theory of diction was that there is "no essential difference between the language of prose and metrical composition." This theory when carried out in uninspired moments made him write very prosaic and tedious verse, which at times was even absurd. But when his creative power was at its height, he wrote melodious and stirring poetry.

The poems produced by him between 1798 and the date of his death may be conveniently divided into two groups, those written previous to 1814 representing his best work. Chief among these are the exquisite lyrics *My Heart Leaps Up*, *To The Daisy*, *She was a Phantom of Delight*, *I Wandered Lonely as a Cloud* and *The Solitary Reaper*; the sonnets to Milton, to Toussaint L'Ouverture, *It is a Beautiful Evening* and *Westminster Bridge*; the *Ode to Duty* and *The Ode on the Intimations of Immortality*; the shorter narrative poems, *Michael*, *Resolution and Independence*, *The Brothers* and *Margaret*; and *The Prelude* and *The Excursion*, both of which contain statements of his experience and philosophy. After 1814 his powers began to decline, and though he wrote much poetry, little of high merit appeared. His great work had already been accomplished. The central figure of the

Romantic movement, Wordsworth helped to free English poetry from the artificial style of the 18th century, he revealed the beauty of simple things and simple people, and by his poetic gift added priceless riches to the storehouse of English verse.

Work. When a body acted upon by force is moved by that force, work is said to be done. The value of this work is numerically equal to the product of the acting force by the distance the force moves the body in the direction in which it acts. Thus, if a four-pound weight be lifted through a height of six feet, the work done is 4×6 , or 24, foot pounds, the force in this case being that required to overcome the force of gravity. It is essential that motion take place in order that work may be done. A great force may be exerted for a long time upon a body, but no work is accomplished if no movement takes place. See FOOT POUNDAL; FOOT POUND.

World Court, an international court provided for in Article XIV of the covenant of the League of Nations and officially known as the Permanent Court of International Justice. It is composed of judges representing the main forms of civilization and principal legal systems of the world and was formally opened to all nations of the world in May, 1922. It is financed by the League and meets at least once a year, June 15, at The Hague, Netherlands. Members of the court are nominated by the Court of Arbitration and elected for a term of nine years by a majority vote of both voting bodies of the League—the Assembly and the Council. Each national group nominates four members, only two of whom shall be of its own nationality.

Any nation, whether or not it is a member of the League of Nations may bring a disagreement to the court for decision if the other party to the dispute consents. The judges find the law which applies to the situation. These court decisions will form a permanent system of international laws. There are no provisions for enforcing the decisions of the court except that in Article XIII of the League covenant the members agree to "carry out in full good faith any award rendered," and not "resort to war with any member of the League which complies therewith."

The court is now composed of 15 members

—11 judges and 4 deputy-judges. The nations represented are: judges—United States, Cuba, Brazil, Japan, Great Britain, France, Italy, Spain, Switzerland, the Netherlands, Denmark; deputy-judges — Norway, Roumania, Jugo-Slavia, and China; the registrar is from Sweden. Charles Evans Hughes is the member from the United States.

World's Columbian Exposition, an international exposition held in Chicago, Ill., from May to November, 1893, to celebrate the 400th anniversary of the discovery of America by Columbus. The exposition was located in Jackson Park on the shore of Lake Michigan. Two years were spent in preparation for it.

The architectural effect was one of the most beautiful ever produced and the exposition was often referred to as the "White City" and the "Dream City." Practically all nations of the world were represented, and the leading nations of Europe, China, Japan and Mexico made elaborate exhibits. The exposition was opened May 1, 1893, by President Grover Cleveland. The total cost was over \$40,000,000, the total attendance was 27,539,000 and the net profits were about \$1,850,000. A series of world's congresses, devoted to the discussion of the leading phases of thought in economic, educational, professional, scientific and religious fields, was held in connection with the exposition.

World War. See **The European War**, Volume 9, page 4092.

Worm, a popular name applied to numerous species of small creeping or crawling animals. The name represents the same class that was once known in scientific classification as *Vermes*; this title has been discarded because of its lack of definiteness, and the name worm has no scientific significance. In general, the term refers to animals, like the common earthworm, which have elongated bodies, with one side conspicuously dorsal, and the other, underneath, called the ventral. One end of the body, which in creeping is directed forward, is modified into a sort of head, and bears the eyes, antennæ and whatever other sense organs the species may have. The muscular, circulatory and nervous systems are well developed, and worms, in general, show great ability to defend themselves from their enemies, provide their food and build their dwellings.

The chief classes of the animals popularly known as worms, and generally dis-

tinguished by the use of some adjective, are: the flatworms, which are marine or parasitic species; threadworms, which are parasitic or mold-inhabiting worms; and earthworms, frequently known as angleworms. These classes all belong in modern zoological classification to the group known as *Cœlomocœla*. The thousand-legged and hundred-legged worms are members of the group *Ceratophora*, and the blindworm is a species of serpent. Many worms, as the cabbage worm, cankerworm and cutworm, are merely the larval stage of various insects. See **INSECTA**.

Worm'wood", a bitter European herb of the Composite Family, probably introduced into the United States because of its medicinal properties. It is found growing upon rocky hillsides and waste lands or along lake and river shores from Maine to Oregon. The stems are rough and hairy, with coarse leaves of irregular size and shape. The flowers are in yellow or purple, rounded heads, very small but crowded full of tiny blossoms. In France and Switzerland a pleasant but harmful drink, absinthe, is prepared from the leaves and flowers distilled with more spicy herbs. On account of its disagreeable taste wormwood has become the symbol of bitterness.

Wounds, *Woondz*. Injuries to the soft parts of the body, which are caused by violence, are ordinarily designated as wounds, but any open sore, whether of internal or external origin, is commonly so-called, as well as lesions resulting from surgical operations. In fact the injury may result from a variety of causes and take the form of a cut, incision or puncture. Contused wounds, or bruises, are caused by contact with hard, blunt bodies; poisoned wounds are those in which some poison has been introduced, as is often the case with bites of serpents, mad dogs, and with ordinary injuries which become infected with germs. Lacerated wounds are those characterized by tearing of the flesh.

Care should be taken to cleanse a wound with water and disinfectants as soon as possible after the injury is in-

flicted; otherwise even a slight hurt may become serious. Before beginning treatment of a wound, the artery should be bound above (if a vein, below) the injury to stop the flow of blood. After being thoroughly cleansed, the wound should be bandaged with antiseptic gauze or other soft cloth. From time to time the bandages should be removed, and the wound cleaned and dressed with fresh bandages.

Wren, Ren, Sir Christopher (1632-1723), an English architect, born at East Knoyle, Wiltshire. He was educated at Wadham College, Oxford, receiving his degree in 1650 and becoming a fellow of All Souls in 1653. In 1660 he was elected Savilian professor. He was one of the founders of the Royal Society and its president in 1681. Drawn into the profession of an architect by circumstances, the great fire in London in 1666 gave him an opportunity to show his real genius. Many buildings built during the next 40 years, planned and devised by him, show how much he raised the standard in design. His great masterpiece is St. Paul's Cathedral, and in it he is buried, having the well-known epitaph, *Si monumentum requiris circumspice* (If thou seek his monument, look about thee). Several biographies of Sir Christopher have been published.

Wren Family. The wrens are mostly small birds (four to five inches in length) of variable habits. In the Old World but 15 species are known, but America has upwards of 150 species. These birds are characteristic of low shrubs, brush piles and cacti fields. The wrens agree very largely in having dark brown, more or less barred backs, with lighter, sometimes white, under parts. They are excitable birds and flit briskly about, usually with their tails erect. They are not good flyers, their wings being much too short for this purpose. They are songsters of the first order, such species as the Carolina nightingale and canyon wrens being notably musical, and some of the smaller wrens possess a voice out of all proportion to the size of their small bodies.

Wrens build their nests in many different locations. The little marsh wren constructs a globular or spherical nest, with the entrance on one side, which is attached to reeds in marshes. These wrens are noteworthy on account of their interesting habit of building more nests than are ever used, the unused domiciles being evidently for the purpose of luring their enemies away from the real nest



HOUSE WREN

containing the eggs or young. The Carolina wren places its nest in hollow trees, or about buildings. In the southwestern part of the United States the cactus wren builds its flask-shaped nest in a cactus, a yucca or in some kind of a thorny bush. The rock wren and the canyon wren build their nests usually in crevices among rocks and rarely in hollow stumps or about buildings. The active and sociable house wren of eastern North America is in bad odor among ornithologists because of its butchery of the young of other small birds, which in some districts threatens the extermination of valuable species. The best authorities discourage the placing of nesting boxes for this wren.

Wrestling, Res' ling, a form of physical contest in which each of two adversaries attempts to trip or throw his opponent, or to force him into a given position which is held to indicate his

subjection. Records which depict contests held 3000 years before the Christian Era, indicate that wrestling was even then a well-developed sport; while both the Greeks and the Romans are supposed to have been familiar with practically all of the falls, holds and tricks known to the present age. Among the Greeks a style similar to our modern *Lancashire*, or *catch-as-catch-can*, style was common, and if one of the contestants fell, the struggle was continued on the ground. In another style, one contestant took his place within a small ring and his opponent endeavored to drag him from it. Strangling, butting, kicking or crushing the fingers of an opponent was not forbidden. For these contests competitors trained with great care; and, in order to keep supple and perhaps prevent undue perspiration, their bodies were rubbed with oil. However, as this made hold difficult, fine sand was provided and with this their bodies were thoroughly sprinkled.

The Græco-Roman style, adopted in France about 1860 and the only style there recognized, is now common also throughout the world, but was not derived from the methods of either Greeks or Romans. Under its rules, the bout does not properly begin until both men are on the ground. Tripping is not allowed, and the rules specifically prohibit contestants from striking, scratching, clasping their own hands together or interlocking their fingers. One may, however, grasp his own wrist in order to strengthen a hold upon his opponent. Contestants are usually clothed only in the trunks of the athlete. A fall is won by the contestant who first forces his opponent's shoulders simultaneously to the mat. Collar and elbow wrestling is the prevalent style in Ireland. In England, besides the *Lancashire*, there is the *Cumberland and Westmoreland style*, in which the contestants stand chest to chest, each with his chin on his opponent's right shoulder, and with his left arm above his opponent's right, and hands locked about his body. To win, one must break his opponent's hold,

force him to touch the ground with some part of his person other than his feet, or must fall, with his opponent underneath, upon the ground. See JIUJITSU.

Wright, Rite, Carroll Davidson (1840-1909), an American statistician, economist and college president, born at Dunbarton, N. H. He received an academic education, served throughout the Civil War, retiring with the rank of colonel, and was later admitted to the bar at Keene, N. H. After five years in the law at Boston, he served in 1872-73 in the Massachusetts Senate, and then as chief of the bureau of labor statistics of his state until 1878. He was appointed national commissioner of labor in 1885 and in this position he made an international reputation. After his election in 1902 as the first president of the collegiate department of Clark University, he continued for some time to direct this important government bureau. He was president of the American Statistical Association in 1902; and, one year later, of the American Association for the Advancement of Science. His works include *The Industrial Evolution of the United States* and *Outlines of Practical Sociology*.

Wright, Harold Bell (1872-), an American novelist, born in Rome, N. Y. He studied at the preparatory department of Hiram College, Ohio, became a painter and decorator and landscape painter, then entered the ministry. His first charge was that of the Christian (Disciples) Church, Pierce City, Mo. He retired from the ministry in 1908, after publishing two novels, *That Printer of Udell's* and *The Shepherd of the Hills*. Other stories followed, which won him great popularity—*The Calling of Dan Matthews*, *The Winning of Barbara Worth* and *Their Yesterdays*. Mr. Wright combines a high moral purpose and great earnestness with an interesting narrative style. Many of his novels have been successfully dramatized.

Wright, Luke E. (1846-1922), an American lawyer and politician, born in Memphis, Tennessee. He practiced law at Memphis, was for eight years attor-

ney-general of Tennessee, was a member of the United States Philippine Commission, civil governor and, later, governor-general of the Philippines and ambassador to Japan. From 1908 to 1909 he was secretary of war in the cabinet of President Roosevelt.

Wright, Orville (1871-), and **Wilbur** (1867-1912), famous American aeronauts. The former was born in Dayton, Ohio, the latter near Millville, Ind. In 1896 the Wright brothers began to investigate the science of aeronautics, and four years later they took their "glider" to Kitty Hawk, N. C. There, in December, 1903, they made their first motor-driven flight, and in 1906 they gave their first public exhibition. The Wrights were pioneers in the field of aviation, and the great progress which has been made in the construction of airships is due largely to their persistent and painstaking efforts. They both aimed to aid in the development of the science of aeronautics rather than to gain a reputation for sensational exploits. Both received the honorary LL.D. from Oberlin College, and the gold medal from the French Academy of Sciences. For a description of the Wright machine, see **AERONAUTICS**, subhead *Biplane*.

Writ, Rit, an order issued by a court in the name of the State to compel the person therein named to do an act specified therein. The writs most commonly issued are: a writ of attachment for the purpose of securing control of property held as security for debt (See **ATTACHMENT**); *capias*, for the purpose of bringing civil action (See **CAPIAS**); writ of error, for the purpose of securing a new trial; *habeas corpus*, for setting at liberty anyone who has been imprisoned (See **HABEAS CORPUS**); *mandamus*, for the purpose of compelling the performance of some public duty; *injunction*, for the purpose of restraining the party named from performing an act specified in the writ (See **INJUNCTION**); *replevin*, for the purpose of recovering property; *quo warranto*, for the purpose of showing by what right an office is held or an act is done (See **QUO WARRANTO**); and

summons, commanding or authorizing officers to notify the person named in the writ to appear in court to answer a complaint.

Writing, Ri' ting, the art of recording thought by making visible signs on some material like stone, wood, papyrus or paper. Ideographic writing is that in which ideas are represented by pictures or signs. Phonetic writing is that in which signs represent sounds. Hieroglyphic writing is an example of ideographic writing, in which the picture became in time a sign. The alphabet which is the basis of our system of writing, is supposed to have been invented by the Phœnicians (See **ALPHABET**). The Romans introduced Latin letters into England, and Roman-Saxon writing was used until the Saxon became the universal writing during the reign of Alfred the Great. Norman writing came in with William the Conqueror.

The direction and style of writing vary with different nations. The Chinese and Japanese write in columns, beginning at the top and going from right to left, while the ancient Mexican, in his picture writing, began at the bottom, and Hebrew is written from right to left. The instruments of writing have varied from the stylus to the modern pen, and the materials, from tablets of stone to modern writing paper. See **HIEROGLYPHICS**; **INK**; **PAPYRUS**; **PEN**; **PENCIL**.

Writs of Assis'tance, in American history, search warrants issued by the courts to customs officers, giving them authority to seize and examine goods smuggled into the colonies. The colonists vehemently opposed these writs because they permitted liberties that left the way open to abuses of personal privacy and property, especially as the officers were not obliged to make any reports. As early as 1754, and at the petition of Governor Shirley of Massachusetts, the British Parliament had passed an act which provided for a better enforcement of the navigation and revenue laws; but no writs to aid this enforcement were asked for until 1761. In Feb-

ruary of that year, while pleading against the issue of such warrants before the Superior Court of Massachusetts, Advocate-General James Otis attacked the entire system of navigation laws as unjust and unwise and asserted that Parliament could not legislate for the colonies. The writs were granted, notwithstanding, but owing to public opinion were seldom used. See WARRANT.

Wryneck, *Ri' nek*", a group of birds living in Europe, Asia and Africa, related to the woodpeckers, but differing in the tail feathers, which are soft. The most familiar species is the common wryneck. The plumage is grayish-brown, mottled with brown and black. The bill is conical and sharp. The birds do not dig their own nests, but use a natural cavity or deserted woodpecker's hole in which to deposit the seven to twelve glossy white eggs. On account of the softness of the tail feathers, the wrynecks do not climb trees, as do the woodpeckers. The name wryneck is derived from their habit of elongating the neck and twisting the head when alarmed.

Württemberg, *Vur' tem berk*, a country of Germany, situated in the southwestern part and bounded by Baden on the s., w. and n., by Bavaria on the e., and also by Lake Constance on the s. The total area is 7534 sq. m. The surface is hilly and mountainous, and a part of the territory in the southwest is covered by the Black Forest. It is an agricultural country, and the yield consists principally of hay, spelt, clover, barley, oats and potatoes. The manufactured products include sugar, iron, textiles, gold and silver work, bells, paper, chemicals, wood carving and musical and scientific instruments. Württemberg is a republic. The supreme power is vested in the Landtag, and this body appoints the State Ministry, the president of which is styled "State President." Modern Württemberg was once a part of the medieval Duchy of Swabia. It became an independent duchy in 1495 and a kingdom in 1806. In 1871, it became a part of the German Empire, and in 1919 was proclaimed a republic.

Wy'andot, or **Huron**, a tribe of North American Indians belonging to the Iroquois family. Originally they lived in Ontario, but they were nearly exterminated by the Iroquois tribe proper, and the remnant fled southward. A few lived in Quebec; the remainder are now in Oklahoma. They sided with the English in the Revolutionary War and the War of 1812.

Wyandotte, *Wi'an dot*, **Mich.**, a manufacturing center of Wayne County, 5 miles southwest of Detroit, on the Detroit River and on the New York Central, the Michigan Central, the Detroit Toledo & Ironton, and the Detroit and Toledo Shore Line railroads. The leading industry is the manufacture of chemicals, including the conversion of sodium chloride into its varied products. Other important manufactures are compression gaskets and automobile radiators, toys, brass valves and fittings, trunks and hand bags, stoves, and cooperage products. Wyandotte was laid out as a village in 1854 and incorporated as a city in 1866. Population, 25,300.

Wyandotte Cave, a celebrated cave in Crawford County, Ind., about 5 m. n.e. of Leavenworth. It is the second largest cave in America and has been explored for 23 m. The cave is widely known for its large chambers, some of which are over 250 ft. high and 300 ft. broad, and for its beautiful stalactite formations, which far surpass those of Mammoth Cave.

Wy'att, **Sir Thomas** (about 1503-1542), an English poet and diplomatist, born near Maidstone, in Kent. His career at court was distinguished and he wrote love lyrics of beauty and power. With Surrey, and the distinction belongs chiefly to Wyatt, he introduced the sonnet into English verse. Surrey was his pupil and their poetry was published together in 1557. See SURREY, HENRY HOWARD, EARL OF.

Wycherley, *Wich' er ly*, **William** (about 1640-1716), an English dramatist, born at Clive, in Shropshire. He was educated in France, and shortly after his

return to England, began writing plays. He was a representative writer of the Restoration comedy, and his plays reflect the manners and literary taste of his time. Though corrupt and immoral, these comedies are characterized by excellent dramatic construction, clearness of language and witty dialogue. His best comedies are *The Country Wife* and *The Plain Dealer*. See DRAMA.

Wycliffe, Wik' lif, John, See WICLIF, JOHN.

Wyoming, Wi o' ming, THE EQUALITY STATE, one of the Mountain States, is bounded on the n. by Montana, on the e. by South Dakota and Nebraska, on the s. by Colorado and Utah and on the w. by Utah and Idaho.

SIZE. The state's greatest extent is from east to west, 355 m., and from north to south the distance is 276 m. The area is 97,914 sq. m., of which 320 sq. m. are water. Wyoming is the eighth state in the Union in size. It is a little larger than Oregon, a little smaller than Colorado, about twice the size of Louisiana and three times the size of Ireland.

POPULATION. In 1920 the population was 194,402. From 1910 to 1920 there was a gain in population of 48,437, or 33.2 per cent. There are 2 inhabitants to the square mile and the state's rank in population is 48.

SURFACE. The eastern part of the state is a portion of the Great Central Plain of North America. This plain rises from an elevation of 3500 ft. at the eastern boundary to meet the foothills of the Rocky Mountains, which rise upon a plateau 5000 to 7000 ft. in altitude. The Laramie Mountains are in the south and the Black Hills from South Dakota enter the northeastern part of the state. The Big Horn Mountains lie in the north-central part and descend on their western slope to the Valley of the Big Horn River. West of this valley are the Shoshone, Grand Tetons, Wind River and other ranges of less importance. In all these ranges peaks 10,000 to 14,000 ft. in altitude are in frequent occurrence. The most noted are Cloud Peak, 13,165 ft., of the Big Horn Range; the Tetons, 10,000

to 13,447 ft.; and Gannet Peak, 13,725 ft., of the Wind River Range.

The continental divide crosses the state from the middle of the southern boundary to the northwest, passing through Yellowstone Park. In the southwest is a barren region known as the Red Desert. The Laramie and Cheyenne plains are more level than the other portions of the state.

RIVERS. Within the state are the headwaters of streams belonging to three river systems, the Mississippi, the Colorado and the Columbia. The Yellowstone and its chief tributaries, the Big Horn and Powder, drain the northern part of the state into the Missouri. The Cheyenne and North Platte flow eastward. The Green River drains the southwestern part of the state and flows southward, uniting with the Grand to form the Colorado. The Snake has its headwaters in the northwestern part of the state, just south of Yellowstone Park.

Among the numerous mountain lakes, those of greatest importance are Yellowstone Lake and Shoshone Lake in Yellowstone Park, and Jackson Lake, Two Ocean Pond and Fremont Lake.

SCENERY. Wyoming is a region of snow-capped mountains, canyonlike gorges and rushing streams, beautified by numerous cataracts and cascades. There are also numerous hot springs and geysers. Most of these are within Yellowstone National Park, which is described under its proper title. In Jackson's Hole, just south of the park, is Two Ocean Pond, so named because streams flow from it whose waters reach respectively the Atlantic and the Pacific. The grandeur of the scenery, combined with the interesting features due to volcanic action, renders the mountainous regions of Wyoming especially attractive to tourists.

CLIMATE. The state has a clear, dry atmosphere, with few cloudy days and light rainfall. The mean annual temperature of the state is about 44°, but in the valleys in summer it may rise to 100° and in winter fall to 40° below zero. Be-

cause of the dryness of the atmosphere, extremes of heat and cold are not disagreeable. The growing season varies in different localities from 80 to 150 days. The average rainfall of the state is $12\frac{1}{2}$ inches. It is heaviest in the northwest, where it may exceed 37 inches, and lowest in the southwest, where it is four inches. Wyoming is an arid state and irrigation and "dry farming" are both used with great success.

MINERALS AND MINING. The mineral resources of Wyoming are beyond estimate. The state is known to contain over 30,000 sq. m. of workable coal measures and is considered second only to North Dakota in its supply of bituminous and lignite coal. Coal mining is carried on in nearly every county and gives employment to about 10,000 men. The most important mines are in the Big Horn, Carbon, Western and Sweetwater counties. The annual output is about 9,500,000 tons.

According to the United States Geological Survey, Wyoming contains over 750 sq. m. of oil fields, and doubtless is destined to become one of the most important oil-producing states in the Union. There are 19 well-developed fields from which high grade oil for illuminating purposes and for fuel is obtained. All of these fields are being developed, but those having the best transportation facilities naturally take the lead. Natural gas occurs in most places where oil is found.

There are extensive deposits of iron ore and sulphur. Gold, silver and copper are mined in small quantities and the supply of granite, sandstone and limestone is practically inexhaustible. The state also contains the most extensive deposits of asbestos in the world.

FORESTS. The forest areas are chiefly in Big Horn, Sheridan, Johnson, Carbon, Albany, Park, Lincoln and Fremont counties. The region adjacent to Yellowstone Park has been made into a natural forest preserve. The lumber is mainly yellow pine, though some hardwood is found. Though lumbering is carried on in a few localities, it is not an important industry.

AGRICULTURE. Wyoming has long been recognized as one of the leading grazing states and it is one of the first in the production of sheep and wool. Her horses find ready sale in other states, and abroad, where they are considered the most valuable for army purposes. Large numbers of cattle are raised and sold to the great meat-packing companies of the country.

Soil. The soil has never been leached by heavy rains and consequently it contains an abundance of plant food. Wherever water can be brought to this soil, large crops are assured, so that the irrigated farm of a few acres often yields a more satisfactory income than a much larger farm depending upon rainfall. In some sections dry-farming is successfully practiced (See DRY-FARMING; IRRIGATION).

Products. Almost every crop known in the north temperate regions can be successfully grown, and potatoes, root crops, alfalfa, oats, barley, rye, wheat, spelt, flax, buckwheat, peas and garden vegetables are certain crops in all sections. In altitudes not exceeding 5000 ft., peanuts, sweet potatoes, tobacco, melons, pumpkins and squashes are successfully cultivated. Apples of excellent quality are grown in many parts of the state and small fruits can be raised in nearly all places.

MANUFACTURES. The manufactures are comparatively unimportant and consist chiefly of lumber, cars and other railroad appliances, flour and gristmill products, tobacco, cigars and cigarettes, plaster and wall plaster.

COMMERCE AND TRANSPORTATION. The Union Pacific Railroad crosses the southern part of the state from east to west. The Burlington system enters the state a little south of the center and extends through it in a northwest direction, sending a spur to Cody. A branch of this system also crosses the northeast corner of the state. The Chicago & North Western Railway crosses the eastern boundary about midway between the lines of the Burlington system and extends westward through the central part

of the state as far as Lander. The Colorado & Southern Railway runs from the Union Pacific at Cheyenne north until it intersects the Burlington. Transportation for places off lines of railway is by wagons and automobiles.

The chief exports of the state consist of live stock, wool, gold, silver and copper, soda, magnesia, sulphur and bentonite, fruit, agricultural products. The imports consist chiefly of manufactured goods and such few products as are not profitably grown within the state.

GOVERNMENT. The state is governed under its first constitution, which was approved in 1890 by Congress. The governor is elected for a term of four years, and in case the office becomes vacant the secretary of state becomes acting governor. The governor in concurrence with the Senate appoints the attorney-general, state engineer, geologist, mine inspectors, game wardens, librarian and members of the various state boards and commissions.

The Legislature consists of a Senate and House of Representatives. One-half of the senators and all of the representatives are elected every two years. The number of representatives must be twice the number of senators and cannot exceed three times that number. The Legislature meets once in every two years and the sessions are limited to 40 days.

The judicial power is vested in a Supreme Court and District Courts. The first consists of three justices elected by the state at large for a term of eight years. There are seven District Courts, each presided over by a judge elected for six years. Justices of the peace administer local justice. Counties are governed by boards of commissioners. The franchise is extended to men and women on equal terms, and a married woman can hold property and carry on business independent of her husband. Child labor laws are strict, as are laws regulating the sale of intoxicating liquors.

EDUCATION. The public school system is under direct control of the superintendent of public instruction and the schools of each county are under the control of a county superintendent and dis-

trict boards. Schools are supported by direct taxation and by funds obtained from school lands. A uniform course of study is in use and textbooks are free. The University of Wyoming, situated at Laramie, is at the head of the educational system. All children between seven and fourteen years of age are required to attend public, private or parochial schools during the time that such schools are in session.

STATE INSTITUTIONS. The State General Hospital is at Rock Springs, with a branch at Sheridan and another at Casper. The hospital for the insane is at Evanston. The school for defectives is at Lander, the soldiers' and sailors' home near Buffalo, the penitentiary at Rawlins and Industrial Institute at Worland.

CITIES. The chief cities are Cheyenne, the capital; Laramie, Rawlins, Rock Springs, Sheridan, Casper and Douglas.

HISTORY. The greater portion of Wyoming became part of the United States territory through the Louisiana Purchase in 1803. The rest of the state came from the Oregon country, 1846; Texas annexation, 1845; and the Mexican cession, 1848. Previous to this the region had been traversed by hunters and trappers. So far as is known, the first American who entered the state was John Colter, in 1807, who explored in the region of the Yellowstone National Park. Portions of the region were explored by Fremont in 1824, but there were few inducements to settle previous to the completion of the Union Pacific Railroad. The Territory of Wyoming was created in 1868 but not organized until 1869. In 1890 it became a state.

GOVERNORS. Francis E. Warren, 1890; Amos W. Barber, 1890; John E. Osborne, 1892; William A. Richards, 1895; De Forest Richards, 1899; Fenimore Chatterton, 1903; Bryant B. Brooks, 1905; Joseph M. Carey, 1911; J. B. Kendrick, 1915; F. L. Houx, 1917; R. D. Carey, 1919; W. B. Ross, 1923; Nellie T. Ross, 1925.

Wyoming, University of, at Laramie (1887). It includes the state college of agriculture and engineering, and be-

sides the government appropriation, receives a state tax of one-half mill. Besides the college of liberal arts there are schools of education, military science and a summer school. Its standards are high.

Wyoming Valley Massacre, one of the most fearful massacres in American history, perpetrated at Wyoming Valley, northeastern Pennsylvania, July 3 and 4, 1778. Under Col. John Butler a band of 1200, including British regulars, Senecas, Tories and militia from Canada, carried murder and pillage to the Yankee settlers in this beautiful valley,

and as a result a village of some 2000 souls was almost depopulated. The few survivors fled eastward to the nearest settlements.

Wyss, *Vis*, Johann Rudolf (1781-1830), a Swiss professor of philosophy and librarian, born at Bern. He is remembered almost solely for his juvenile classic, *The Swiss Family Robinson*, which has enjoyed wide popularity and has been several times translated. His other works embrace *Swiss Folklore and Legends*, *A Tour in Upper Bern* and *Readings in Relation to the Highest Good*.

X

XAVIER, *Zav' i er*, **Francisco de** (1506-1552), the "Apostle of the Indies," was the son of a Spanish nobleman. One of the first Jesuits, he was sent in 1540 to Goa, the capital of the Portuguese settlement in India. Preaching south of Ceylon, about the Straits of Malacca, and to Celebes, he converted thousands. In 1549 he went to Japan with like success. He died at the early age of 46, just as he was carrying his work into China.

Xenia, *Ze' ni a*, **Ohio**, a city and county seat of Greene Co., 55 m. s.w. of Columbus, on the Little Miami River and on the Pennsylvania, the Cincinnati, Hamilton & Dayton, the Pittsburgh, Cincinnati, Chicago & St. Louis and other railroads. It is situated in the Valley of the Little Miami in a productive farming region. The city is of considerable industrial importance. It is known especially for its manufactories of boots and shoes, powder, cigars, machine-shop products, carriages, automobiles, cordage, twine and paper. There are also ice, granite and marble works, flour mills and breweries. The Xenia Theological Seminary (United Presbyterian) and the Ohio Soldiers' and Sailors' Orphans' Home are located here. Wilberforce University (colored) is located in Wilberforce, a suburb three miles distant. Xenia was settled in 1804 and incorporated in 1808. Population in 1920, 9110.

Xenophon, *Zen' o fon*, (about 434-355 B. C.), an Athenian historian and soldier, a pupil and friend of Socrates. He was among the Greeks hired by Cyrus to overthrow his brother, Artaxerxes, and after the fall of Cyrus at Cunaxa and the death of the Greek generals, he led the soldiers back to the shores of the Black Sea. He was exiled from Athens for taking part in this expedition, and settled at Elis, where he spent 20 years in literary work and agriculture.

His chief work is the *Anabasis*, telling the wonderful story of the retreat of the ten thousand Greeks through the hostile Persian Empire. The *Memorabilia* is an account of the life and teaching of Socrates.

Xerxes, *Zurk' zeez*, (about 519-465 B. C.), the son of Darius and probably the Ahasuerus of the Bible. He led the last attack of the Persians against the Greeks in 480 B. C. and was defeated at Salamis. He fled to Persia and later was killed by the captain of his bodyguard, Artabanus, who was plotting to usurp the throne. See SALAMIS, BATTLE OF; ATHENS, subhead *Persian Wars*.

Xingú, *Shen goo'*, a tributary of the Amazon River. It rises in the State of Matto Grosso, Brazil, flows north and joins the Amazon near its estuary. The region drained by its course is wild and unexplored and is inhabited only by savages. It is 1100 m. long and contains several impassable falls. Von den Steinen explored it in 1884.

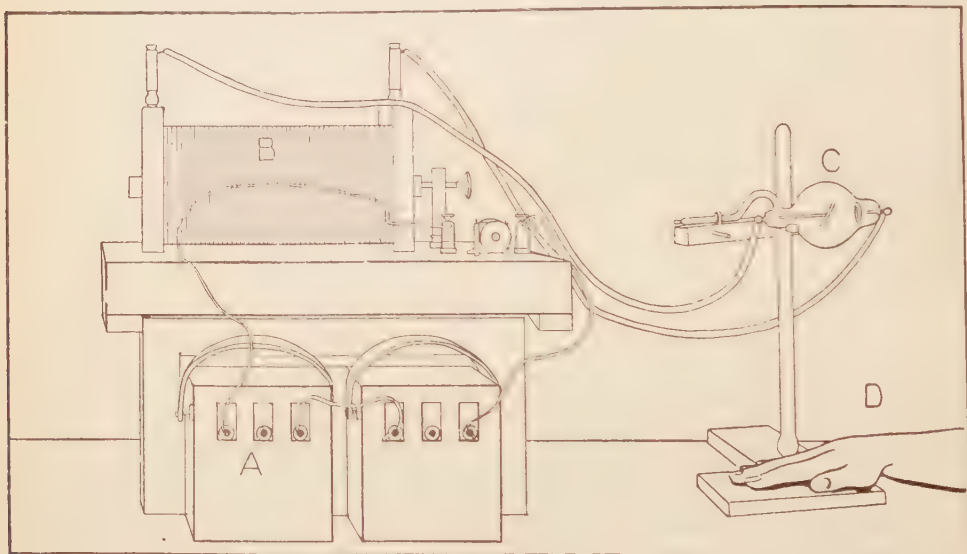
X Ray, or **Roentgen**, *Runt' gen*, **Ray**, a kind of ray, or radiation, discovered by Wilhelm Roentgen in 1895 and having the power of penetrating many opaque bodies. These rays, which are not visible to the eye, were discovered in connection with experiments with the Crookes tube; this is an electrically connected tube from which the air has been almost entirely removed. Rays differing from light rays (See LIGHT) and also from cathode rays (See CATHODE RAYS) were noticed outside of the tube by certain chemical effects which they produced. Because of the uncertainty about their nature and possibilities Roentgen called them X rays; later scientists have preferred to name them after their discoverer.

Although these rays are evidently not capable of affecting any of our senses, they make themselves known by their ef-

fect on other things. For instance, they are able to penetrate opaque bodies to a greater or less extent according to whether the atomic weight of the body is small or great, and, having passed through the body, they are still able to affect a fluorescent screen or a sensitized plate in the same manner as do light rays on a camera plate. This quality has made possible the X-ray photographs, or radiographs, which seem like magic, for they reveal on the sensitive plate the bones of the hand when an X-ray picture of the hand has been taken, and

tions or waves. Neither are they ordinarily reflected or brought to a focus by a lens. They have the power of discharging electrified bodies. Their velocity is the same as that of light.

Aside from their use in making radiographs, X rays have other uses in medicine and are being employed in curing certain diseases, especially those of the skin. In their first use X rays cause little or no sensation; later the skin becomes discolored and toughened and the gland ceases to act. Pain caused by inflammation is relieved and congestions



X-RAY APPARATUS

A, battery; B, induction coil; C, Crookes tube; D, hand on the plate ready to be photographed

disclose the contents of a closed box. For this reason these rays have been of great use in surgery for locating foreign bodies in the flesh, dislocations and other hidden sources of trouble, and in dentistry for locating cavities, abscesses, etc. One of the commonest uses, perhaps, is in locating, in the esophagus, objects which children have accidentally attempted to swallow.

Speaking somewhat technically, X rays differ from light rays in being probably irregular, single pulses in the ether, rather than continuous, regular undula-

are reduced by careful use of the rays, while all areas treated are found to be unsuitable to the growth of bacteria. The burns which they cause are, however, exceedingly painful and difficult to cure. For this reason the rays should be used with great care and then only under the direction of a skilled operator.

A recent application of the X ray has been made in combination with the microscope for the purpose of taking radiographs, or skiagraphs, of very small objects that cannot be seen with the naked eye. These pictures, called microradio-

graphs, disclose the internal structure of minute animals, shells, etc., in the same manner that the radiographs do of larger forms, and by this means many hitherto unknown details of microscopic anatomy may be studied. See FLUOROSCOPE.

Xylology, *Zi lol' o jy*, the science of identifying wood. This new profession has grown up as a department of forestry and because of the waning wood supply of the United States. When black walnut, birch, poplar, black cherry, red gum and white pine were common in the United States there was no need for fraud or the substitution of other woods in their places. Since much wood now has to be imported, it is not seldom that a householder finds that whitewood has been used in place of white pine or ash for oak. It is said that 25 different kinds of wood have been and are being sold for mahogany in London, Liverpool and New York. The xylogist is the expert who, with the aid of his microscope, is able to distinguish woods, detect frauds and even discover new uses to which woods may be put or new woods that

may be put to old uses. The profession is a new one, but promises a rich field wherever lumber is bought and sold.

X Y Z Papers, the name given to the dispatches sent in 1797-1798 to the United States Government by its commissioners, Elbridge Gerry, John Marshall and Charles Pinckney, who had been sent to France to settle certain difficulties with that government. They were not received officially upon their arrival and were compelled to communicate with the government through three agents who informed them that the first step toward negotiation would be the payment of a large sum of money to the Directory, then in control of French affairs. Marshall and Pinckney withdrew, but Gerry transmitted the correspondence to President Adams, who substituted the letters X Y Z for the names of the French commissioners and laid the correspondence before Congress. A bitter feeling was aroused in the United States and a naval war with France begun, but the French Government receded from its position and averted a struggle.

Y

YABLONOI, *Yablonoi'*, **MOUNTAINS**, a system of partially unexplored mountains of southern Siberia. They extend in a north-east-southwest direction until they finally seem to unite with the Stanovoi system. The highest peak thus far known is in the southwestern part, and is about 8000 feet in height.

Yacht, *Yot*, a vessel which is propelled by means of sails, steam, or electricity and now used principally as a pleasure boat. Sailing yachts are chiefly cutters, schooners, luggers, yawls and ketches and may be of any rig suited to their size. The word *yacht* is of Dutch origin, meaning a swift vessel from which to chase or hunt. The modern motor boat is a development of the small yacht or pleasure launch.

Yachting is a form of sport and recreation known to have been in vogue among the Greeks and Romans. Yacht-racing has been recognized as an international sport since 1851, when the *America* won by a single race around the Isle of Wight a \$500 cup offered by the English Royal Yacht Squadron. This cup has since been held by the New York Yacht Club as a world trophy. It was first defended in 1870 by the *Magic* and afterward was challenged many times. Sir Thomas Lipton was an untiring British challenger whose yachts the *Shamrocks I, II, III, and IV* were successively defeated in races off Sandy Hook.

Yak, a large wild or domesticated species of ox found in Tibet and on the Himalayan highlands. The wild yak is generally blackish brown and the domesticated animal, black and white. It has spreading horns and short legs and is covered with a thick coat of long silky hair which hangs from each side like a curtain and is also long on the tail. It is a source of wealth to the na-

tives, who use it as a beast of burden and utilize its milk, flesh, skin, and hair. The curd of the milk is used both fresh and dried and excellent butter is made, which is preserved for some time in bladders. The flesh is dried and eaten raw. The hair is used for ropes, tent coverings, and cloth; and clothing is made from the skin. In China the tips of the tail, dyed red, are used as tassels and in India they are used as fly flappers.

Yakima, *Ya'ke-ma*, **Wash.**, the chief distributing center and county seat of Yakima County, on the Yakima River and on the Northern Pacific and Union Pacific railroads. It has a municipal airport. Yakima is the center of a famous federal irrigation project and has a large trade in agricultural products. The industrial plants include large cold-storage plants, lumber and flour mills, dehydrators, sash and door factories, and canneries. The Washington State Fair is held here annually. Population, 23,100.

Yale, **Elihu** (1648-1721), an English colonial official, the early patron of Yale College. Born near Boston, and educated in England, he entered the service of the British East India Company and rose to the governorship of Fort St. George at Madras, India, amassing a huge fortune. He returned to England in 1692, where he was made governor of the East India Company. His large gifts to a school at Saybrook, which was later transferred to New Haven, Conn., led to its being named Yale College. See **YALE UNIVERSITY**.

Yale University, at New Haven, Conn. (1701). Yale College had its beginning in the Collegiate School of Connecticut, founded by ten Congregational ministers, and opened at Saybrook, but removed to New Haven in 1716. Two years later it took the name of

an English benefactor, Elihu Yale, whose father, one of the settlers of New Haven, had removed to Boston and later to England. The state has always treated the institution much as a state university. The governor and lieutenant-governor, with six members chosen by its alumni and the successors of its ten founders, now constitute the Yale Corporation. It became a university in 1887, maintains a large number of departments, and, with its splendid record of more than two centuries, continues to rank among the greatest of American institutions. Yale is non-sectarian and to a degree coeducational, admitting women to several departments and to its graduate schools. Its forest school, founded in 1900 by Mr. and Mrs. J. W. Pinchot and their sons, with an endowment of \$150,000, is of special interest because of the international importance now attaching to such work (See FORESTRY). Graduates of this school receive the degree of master of forestry. The university also includes a graduate school, a school of fine arts and the Sheffield Scientific School, the academic department and departments of theology, department of law and medicine. Its library contains about 1,100,000 volumes. Its grounds and buildings represent a large investment. The endowment fund is approximately \$20,000,000. There are some 3500 students. See WOOLSEY, THEODORE DWIGHT; PORTER, NOAH; DWIGHT, TIMOTHY; HADLEY, ARTHUR TWINING.

Yalu, Yah" loo', River, or Yalu-kiang, a large river of Asia forming for a long distance the boundary between Korea and Manchuria. It rises in the Chang-peh-shan Mountains and flows in a southwesterly direction into Korea Bay. Its actual length is 300 m., but it is navigable for little more than 30 m.; its principal use is for floating lumber to the coast. The cities of Wiju and Antung are near its mouth. The river is noted for the naval engagements of the Chino-Japanese War and the land operations of the Russo-Japanese War that were carried on in its vicinity.

Yam, the tuberous roots of several species of plants of the Yam Root Family. The plant is decidedly tropical and is a slender, shrubby, climbing plant which also twines if grown in the sun. The leaves are broad and sometimes slightly lobed; the flowers are inconspicuous and of greenish color. The wild yam grows throughout the thickets of northern United States and Canada. Its roots are not edible. The tubers of the sweet yam are sweet and of pleasing flavor; in the tropics they replace potatoes, although their starchy flesh is coarser. Yams are cultivated in the West Indies and other tropical countries. A variety of sweet potato in the South is known as the yam. It is longer than ordinary sweet potatoes, and its flesh is a darker color.

Yan'cey, William Lowndes (1814-1863), an American lawyer and orator, born in Georgia. In youth he went to Alabama, where he studied law, and, admitted to the bar in 1834, began to practice at Montgomery. For a time he engaged in journalism and belonged to both branches of the State Legislature, meanwhile gaining prominence as a lawyer and as a Whig orator. In 1844 he was elected to Congress, and, upon his retirement two years later, became a leader of the extreme pro-slavery party in the South. He reported the Alabama ordinance of secession in the convention which met at Montgomery, Jan. 7, 1861, and a few months later was appointed a Confederate commissioner to obtain recognition for the Confederacy in Europe. Returning in February, 1862, he entered the Confederate Senate, where he served until his death.

Yangtse-kiang, Yahng' tse'-kyahng', a large river of China, fully 3000 m. in length. Near its source it passes through many narrow gorges, and it leaps toward the sea in cataracts and falls that render it there unnavigable, even to the rude rafts of the natives. About 1500 m. from the sea it is less treacherous, and active trade is carried on upon it by means of small boats and rafts. Steamboats ascend it for nearly

800 m., and ocean boats can go at least 600 m. Many great rivers are tributary to the Yangtse-kiang, and these together drain all the central provinces of China. The silt brought down annually nearly equals that washed into the Gulf by the Mississippi. Kingchow, Hanyang, Hankow and Nanking are all important cities along its banks. The great Imperial Canal, which connects Peking on the Hoangho with Hangchow, crosses the Yangtse-kiang not far from the East China Sea. The river's steamboats are among the largest river boats in the world.

Yankee Doodle. See HYMNS, NATIONAL.

Yap. The westernmost island of the Western Caroline Islands, situated 500 miles s.w. from Guam and 800 miles e. of Mindanao in the Philippines. Population is about 7,000. Its importance lies in its location, it being the site of the relay stations for the cables between America and the Orient. The nation that controls Yap controls the cables passing through the island and the messages they carry; and in event of war could prevent communication between America and Asia.

Yard. See WEIGHTS AND MEASURES.

Yarrow, a common, perennial weed of the Composite Family, producing a drug which has a variety of medicinal uses. The plant is native in Europe and Asia but was brought to the United States, probably because of its value as an herb, and, like its relative the tansy, has found the soil and climate suitable to its growth. The stems are straight, growing from one to two feet high, and bear a handsome, feathery foliage not much admired because of its commonness, but having a pleasing aroma. The flowers are yellowish, gray-white or occasionally rose-pink in color. The plant grows throughout the United States in meadows, along roadsides and in all but the most carefully weeded gardens. It was once extensively used, like its cousin, the chamomile, for making an herb tea. The leaves and flowers yield an extract, grateful to wounds and of value as a stimulating tonic. Yarrow has many local names, as

milfoil, thousandleaf, dog daisy, soldier's woundwort, old-man's-pepper, white tansy, sneezewort, pellitory and goose tongue.

Yarup. See FLICKER.

Yates, Richard (1818-1873), an American statesman, born in Warsaw, Ky. In early youth he was taken to Springfield, Ill. He graduated from Illinois College, began to practice law at Springfield and soon became prominent in his profession and as a Whig. From 1842 to 1849 he served in the State Legislature, and from 1851 to 1855 sat in Congress, joining the Republican Party upon its organization. As governor of Illinois, from 1861 to 1865, he was one of the most active of "war governors." In 1865 he became United States senator and served one term. His son, Richard, was elected governor of Illinois for the term 1901-1905.

Yaz'oo River, a river of Mississippi, rising in the northwestern part of the state. The river has a total course of nearly 300 m. and enters the Mississippi about 12 m. above Vicksburg. The principal tributaries are the Coldwater, Tallahatchie and Yalobusha rivers. The Yazoo is deep and navigable throughout the year.

Year, Yeer, the time in which the earth passes once around the sun. The tropical, or solar, year is the time required by the earth in which to pass from a given point in its orbit to the same point again. This time is 365 d., 5 h., 48 min., 46 s. This is the year of practical life, usually reckoned 365 days for three years and 366 for the fourth. The sidereal year is the time required by the earth in moving from the point where a meridian reaches a fixed star until it reaches the same star again. On account of the precession of the equinoxes, this is about 20 min., 22 s., longer than the solar year. See PRECESSION OF EQUINOXES; SIDEREAL TIME.

Yeast, Yeast, a group of one-celled fungus plants, interesting because of their uses and habits of growth. Each tiny individual reproduces by means of a process called budding whereby a small

protuberance or bud grows out from the original cell and forms a new plant, which either remains united to the old, so that in time a long chain is made, or breaks off to form a new individual. The ordinary commercial yeast cake consists of millions of these plants combined with large starch grains. If the cakes are kept in a warm place, the plants begin to grow, and other organisms, such as bacteria, develop upon them and the cakes spoil. The plants placed in dough grow by feeding upon the sugar solutions and breaking them up into alcohol and carbon dioxide. The formation of the gas causes the operation known as "rising." When the bread is baked the alcohol evaporates and the enlarged air cells make the bread "light."

The yeast used in making beer is a cultivated yeast and the study of it for the purpose of getting pure cultures for the German brewers led Pasteur to begin his great study of bacteriology. Wine yeasts grow "wild" in the soil of the vineyards and hence do not need to be introduced into the grape juice, since they have been already taken up into the fruit through the plant roots and need only a slight amount of heat to start their growth. The entire life history of the yeast is not fully known; the plants are of a low order of fungus and are capable of resisting drying by acquiring a peculiar form not adopted unless necessary. They take part in all process of alcoholic fermentation. See BACTERIA.

MANUFACTURE. The cultivation of the yeast plants and the manufacture of yeast cakes form a great industry and one which requires especial cleanliness. The raw materials are rye, barley and Indian corn. The grain is cleaned in special cleaning machines and a portion of it ground to flour. The unground barley is taken to the basement where the malting and germination are carried on. In this process a ferment known as diastase is developed, which is the principle in the yeast that turns the starch to sugar. The dampened barley is placed in double-walled cylinders which perform a revolution once in 40 minutes. In about

nine days the operation is completed and the grain is taken out to be dried in long brick-walled rooms where the barley is spread out. Any rootlets formed in the process are then broken off and the grain is broken but not ground between huge rollers, after which it is mixed with water to form a sweet liquid called *must*. The preparation of must takes place in mascerating tubs where the flour, barley and some starch are mixed. This process is called *saccharification*, and when it is completed the resulting mushy mass is cooled in refrigerating vats holding 220,000 gallons each. In these tubs a number of yeast plants are literally planted, and as fast as the plant spreads, the new yeast is scraped from the surface and pressed into the cakes familiarly seen in the market. The inoculation of the malt with the yeast must be attended with great care, and the temperature must be kept between 25° and 30° C. The must remaining after the fermentation is completed is used in the manufacture of alcohol, of a valuable cattle food and carbon dioxide. The latter, when a by-product of yeast manufacture, is generally liquefied and placed upon the market in steel cylinders.

Yeats, Yates, William Butler (1865-), a British poet, essayist, dramatist, and fervent nationalist, born in Dublin, where he obtained his education. His first printed poem appeared in the *Dublin University Review*, when he was 19 years of age. In 1888 he began a literary career in London, and the following year published a volume of verse entitled *The Wanderings of Oisín*, the romantic beauty of which created a new interest in Irish literature. Volumes of prose tales, essays and poems followed, as well as a number of plays, and he also became actively associated with Lady Gregory and John M. Synge in the revival of the native Irish drama (See IRISH PLAYS). Mr. Yeats is regarded as one of the foremost representatives of the literary side of the Irish national movement. Although he owes his inspiration partly to the Pre-Raphaelites and to Blake, Shelley and Maeterlinck, he has devoted himself

to the study of Irish folk lore and has created works of enduring value from the rich storehouse of Gaelic myth and legend. His prose style is clear and graceful; his poetry is characterized by mysticism and lyric beauty. He became a senator of the Irish Free State in 1922 and in 1923 won the Nobel Prize for Literature. His plays include *The Countess Cathleen*, *The Land of Heart's Desire*, *Cathleen in Hoolihan*, *The Pot of Broth*, *At the Hawk's Well*, and *Two Plays for Dancers*. *The Wind among the Reeds* contains some of his best lyrics, and *Ideas of Good and Evil*, literary and critical essays. He also edited *Works of William Blake* and *A Book of Irish Verse*.

Yel'low. See COLOR, THEORY OF.

Yel'lowbird". See GOLDFINCH.

Yellow Fe'ver, an acute disease which has prevailed extensively in American ports but which is rarely known in the other continents. It has been known in Spain and in Africa, probably having been carried from the West Indies. The disease is characterized by the peculiar yellow tint given to the skin, a high fever for a comparatively short period, disturbances of the digestive tract and hemorrhages into the skin and mucous membranes. It was recognized in the middle of the 17th century when it was found to prevail in the West Indies, Mexico and ports of both North and South America. An especially severe epidemic in southern United States in 1878 led to a careful scientific investigation of the disease by doctors Reed, Carroll, Agramonte and Lazear, who proved absolutely that the bacillus causing the disease is carried by a certain species of mosquito, scientifically called the *Stegomyia fasciata*, which transmits the disease through its bite. This mosquito lives in the hot moist regions where the fever is common, and with the approach of cold weather both the mosquito and the epidemic disappear. See MOSQUITO.

The period of infection is from three to seven days, and the disease may first manifest itself in severe chills or in a period of lassitude, headache and low fever. The fever rises rapidly and lasts but from three to five days. The tongue is coated except at the tip, which is bright red, and the limbs and back ache

incessantly. These symptoms are accompanied by extreme nausea and the yellow coloration of the skin. No food should be given for the first few days and then only easily digested liquid foods. If the disease is to prove fatal, "black vomit" appears and marks the alteration in the blood. From this time on the patient is generally delirious, and sometimes passes away in a very short time. If the disease does not terminate fatally, the fever abates after three or four days and a complete recovery takes place in two or three weeks. One attack renders a patient wholly immune.

Since the American occupation of Cuba and the scientific investigation of the spread of the disease, yellow fever has been practically exterminated. Ships from "yellow fever" ports are now carefully disinfected and searched for the presence of the deadly disease-carrier and thus the spread of the disease is prevented.

Yel'low-Ham'mer. See FLICKER.

Yellow Sea, or Hwang-hai, a gulch of the Pacific Ocean, lying between the western coast of Korea, the eastern coast of China and the southern coast of Manchuria. Its maximum width is 300 m., and its depth seldom exceeds 300 ft. The Loo-choo Islands are on the south. Korea Strait connects it with the Sea of Japan, and in the north are formed Korea Bay, the Gulf of Pechili and Gulf of Liaotung. It receives the waters of the Yangtse-kiang and of the Hoangho. It has derived its name from the large quantities of yellow mud deposited in it by these streams.

Yellowstone National Park, a government reservation set apart as a pleasure ground and game preserve and located in the northwestern part of Wyoming, extending on the north and the west about 2 m. into Montana and Idaho respectively. It measures 54 m. from east to west and 62 m. from north to south. The area of the original reservation is about 3350 sq. m., but later the Yellowstone Park Forest Reserve was added on the south and east, increasing the area to 5500 sq. m.

The park lies in the heart of the Rocky Mountains and, in the main, consists of a plateau varying in altitude from 7500 to 8300 ft. and surrounded by rugged mountain ranges with snow-capped summits. The most important of these ranges are the Gallatin on the north, the Shoshone Mountains on the south and the Absarokas on the east. The southern boundary of the Forest Reserve extends to the Wind River and Teton ranges. There are 24 peaks within the park which exceed 10,000 ft. in altitude. The most striking of these is Electric Peak, 11,155 ft., directly on the northern border. From its summit one of the finest views of the park can be obtained. The continental divide crosses the park in an irregular line from the southeastern corner to about the middle point on the western boundary. The waters south of the divide find an outlet through the Snake and the Columbia rivers to the Pacific. Those to the north reach the Missouri and thence the Atlantic.

RIVERS AND LAKES. The northwest and the west-central portions of the park are drained into the Missouri by the Madison and the Gallatin. The Madison is formed by the Gibbon and the Fire Hole. The southern part is drained into the Snake and the eastern into the Yellowstone, which flows through the entire length of the park from south to north. All streams are characterized by rapid currents, numerous gorges and cascades and clear, cool water abounding in fish. They add much to the beauty and variety of the scenery. The park contains a number of lakes, the most important being Shoshone, Lewis and Jackson, all in the southern part or just across the southern boundary. But the Yellowstone Lake is of the greatest importance. It is 20 m. long, 10 m. wide, has an area of 139 sq. m. and an altitude of 7741 ft. It is the largest lake in North America having so great an altitude and one of the most beautiful mountain lakes in the world. Its waters are clear and cold and abound in fish. The Yellowstone River enters the

lake near the southeast corner and leaves it at the northern end and thence flows northward to the Missouri. Soon after leaving the lake the river flows through a broad and fertile valley, which at its lower end narrows into a gorge, through which the stream winds its way. The walls approach each other, and the velocity of the current increases until a series of cascades is reached. Just below these the river plunges by two cataracts into the Grand Canyon, which for the grandeur and beauty of its scenery has no parallel in the world. The first cataract, or Upper Fall, is 110 ft. high, and the second, or Great Fall, has a perpendicular fall of 310 ft. The canyon extends for about 9 m. below the fall, and the first 5 m. include the scenic portion. The gorge is from 1200 to 1400 ft. deep. In many places the walls have been worn into fantastic forms, and for the entire scenic portion the rock is a beautiful commingling of red, yellow, terra cotta and buff tints. In the depths below flows the stream, a branch of emerald tipped here and there with silver.

GEYSERS AND HOT SPRINGS. Yellowstone Park is one of the few regions where volcanic action is still found near the surface. The region abounds in springs. Some are clear and cold and some possess valuable mineral properties, but the distinguishing feature of the park consists in its hot springs and geysers. There are more than 70 active geysers, some of which are the largest in the world. They occur in six regions, three of which are generally visited by tourists. These are the Norris Basin, the Middle and the Upper Geyser basins. The Upper Basin is the largest and the most interesting. Here are found Old Faithful, the Giant, the Bee Hive, the Castle, Riverside and a number of other large geysers, all intensely interesting. See GEYSER.

Interspersed among the geysers in each of these regions are innumerable hot springs of sizes varying from a punch bowl to a good-sized pond. No two are alike. Each shows a hue different from the others, and some, like the Pris-

matic Lake, under the reflection of the sun exhibit all the colors of the rainbow. Some are as blue as the sapphire, others as green as the emerald. This change of color is due entirely to the reflection of light, since the water in all cases is transparent and colorless. The incrustations around the craters of these springs and the geysers are remarkable for their delicacy and beauty. The hot water contains lime and silica in solution, and as it cools and evaporates, these substances solidify. Thus in the course of years are built up these wonderful formations, the most extensive being those of the Mammoth Hot Springs. The colors are white, yellow, red and brown.

OTHER INTERESTING FEATURES. A great part of the park is forested with black pine and other varieties of trees. This adds much to the beauty of the landscape. Obsidian Cliff, north of Norris Basin, is a mountain of volcanic glass. Sulphur Mountain, just west of the Yellowstone River, is almost pure sulphur. Mammoth Paint Pots in the Middle Geyser Basin is a large pool of boiling clays of various colors, and in the northern section there are several petrified trees.

Of equal interest are the native animals, including buffalo, elk, deer, mountain sheep, coyotes and black and brown bears. The protection afforded these animals has dispelled the fear with which they usually regard man, and some of them, especially the bears, become quite tame.

ADMINISTRATION. The park is under the control of the secretary of the interior and under the immediate direction of the superintendent, whose headquarters are at Ft. Yellowstone near Mammoth Springs. The superintendent is an army officer and is assisted in his duties by detachments of soldiers occupying a number of posts throughout the park. Regulations for protecting the scenery and animals are strictly enforced. The roads are in charge of the United States Government. Hotels and camps are stationed at convenient points for tourists. June and July are the most

desirable months for visiting this wonderland, and during this season it is explored by thousands of tourists. Consult Chittenden's *Yellowstone National Park*.

Yellow Warbler. See WARBLER.

Yemen, an independent state, on southwest Arabia on the Red Sea, with an area of 75,000 square miles. It is governed by an imam. The country is mountainous with lofty plateaus and mountain chains that reach in some places an altitude of 10,000 feet. On the coastal slope is a salt plain, probably once a part of the ocean floor. Elsewhere agriculture is an important pursuit. Much of the best Arabian coffee is grown in Yemen. Sana, the capital, Damar, Hodeida, and Mocha are the important cities. Pop. 1,000,000. See ARABIA.

Yenisei, Yen' e seh' e, River, a large river of Siberia rising in the northern slopes of the Altai Mountains and flowing northwest by the Gulf of Yenisei into the Arctic Ocean. It is a wide river and navigable to ocean boats for nearly 2000 m. In the spring when the snow melts, the water sometimes rises 30 ft. above its ordinary level, and it then becomes a turbulent stream with many cataracts and rapids. The mouth is free from ice for but a few weeks of the entire year, and through its whole course there is ice generally from November to May; thus the Yenisei is of little use for commercial purposes.

Yerkes Observatory, an astronomical observatory situated on the north side of Lake Geneva, Wis., the largest and finest in the world. This observatory and its splendid equipment were given by Charles Tyson Yerkes to the University of Chicago. The total cost was about \$400,000. Its location, about 75 m. north of Chicago, was chosen largely for climatic reasons. The building is 300 ft. long by 80 ft. wide. In the western end is the large refracting telescope containing a lens made by Alvan Clark of Boston, Mass., which is 40 inches in diameter, three inches thick and weighs 760 lb. The tube of this telescope is

made of sheet steel, is 52 inches in diameter, 64 ft. long and weighs 12 tons. It is mounted on a pier 44 ft. high. The dome is 80 ft. in diameter and 100 ft. high. The floor is raised or lowered by electrical machinery so that when the telescope is elevated or depressed the eyepiece may be easily reached. The whole telescope is operated by delicate electrical devices so that it can be easily adjusted to a nicety. See ASTRONOMY; LICK OBSERVATORY; TELESCOPE.

Yew, *Yū*, a tree or shrub of the evergreen family, several species of which grow in the United States. It is generally short and bushy, but may attain considerable height. The leaves are much reduced like those of all pines and, according to species, range in color from a yellowish-green to a very dark green. The fruit is a red fleshy cup which nearly conceals the seed. The bark is brown or reddish-purple and scaly, and the tough wood was once much used in making bows and is now used in cabinet-making. It is often cultivated in cemeteries or church-yards. In tropical or subtropical countries the yew attains great size and age. One in Mexico is said to be 6,000 years old and 119 feet in circumference.

Yokohama, *Yo' ko hab' ma*, a seaport of Japan, situated on the south coast of the main island, on the west shore of Tokyo Bay, 18 m. s. of Tokyo. South of the town, on "The Bluff," is a wealthy foreign settlement; the town itself is carefully planned and laid out and contains the prefectural buildings, the post office, the courthouse, the railway station, the custom-house, hospitals, the Protestant Union, an Anglican, a French-Catholic and several native churches. The harbor is lined with docks, has a pier 2000 ft. long and is protected by giant breakwaters 12,000 ft. in length. Yokohama is the center of a large silk industry, and silk, silk goods and tea are the principal exports. The imports include rice, cotton and cotton goods, wool and woolen goods, metals and metal products. In 1859 it was only a small fishing village, but it was then opened to foreign trade and its growth

was very rapid. The first railway in Japan, constructed in 1872, connected Yokohama with Tokyo.

The great earthquake of 1923 left Yokohama a city three-quarters destroyed, with its great docks torn asunder, its shipping wrecked, its silk industry crippled, and great numbers of its inhabitants killed. The work of constructing a thoroughly modern city on the ruins was immediately begun. Pop., 460,000.

Yonkers, N. Y., a manufacturing and residential city of Westchester County, adjoining New York City on the north, on the east bank of the Hudson River, and on three divisions of the New York Central Railroad. It has a river frontage of four miles, with a deep-water channel accommodating ocean freighters, a barge canal, and a marine terminal. The port is included within the limits of the New York and New Jersey Port Authority. It is a port of call for the Hudson River Day Line Boats, and ferry service to New Jersey is also maintained.

Yonkers is beautifully situated on terraces which rise from the Hudson to an elevation of 426 feet above tide-water, and commands an extensive view of the river and of the Palisades on the opposite shore. In the residential parts of the city are the homes and estates of many New York City business men. It has a number of residential districts under various names, such as Homefield, Park Hill, Crestwood, Fleetwood, Cedar Knolls, Bryn Mawr, Ludlow, and Lawrence Park West. Glenwood, on the west, contains the estate of Samuel Untermyer, formerly owned by Samuel J. Tilden, which commands a view of the Statue of Liberty and contains beautiful botanical gardens which are open to the public at certain times. The city's most interesting structure is the old Philipse Manor House (1692), where Washington called on the charming Mary Philipse. It was used as a city hall from 1872 to 1908, and now is used by the New York Historical Association as a museum for colonial and Revolutionary

War relics. There are 18 parks throughout the city, most of which have in connection a well-equipped playground for children with paid attendants. Tibbets Brook Park has a fine bathing pool.

The leading industry of Yonkers is the manufacture of carpets. There are extensive sugar refineries and a large elevator-manufacturing plant. Other products include chemicals, wire and cables, millwork, foundry products, hats, and plumbers' supplies, and there is a large textbook-publishing house.

Yonkers derives its name from the Holland name *Jonkheer*, meaning "young nobleman." The first settlement was made by Dr. Adraen Van Der Donck, the first historian of New Netherland, and several Dutch families in 1646. From 1672 to 1779 the township was included in the Philipsburg Manor and was called Philipsburg. In 1788 the township of Yonkers was organized and in 1855 the village was incorporated. In 1872 a city charter was granted. Population, 121,300.

York, Pa., a manufacturing and agricultural center and the county seat of York County, 28 miles southeast of Harrisburg, on Codorus Creek and on the Pennsylvania, the Western Maryland, and the Maryland & Pennsylvania railroads. The Lincoln Highway and the Susquehanna Trail intersect here, and the city has an airport.

York is among the world's leading centers for the manufacture of refrigerating and ice-making machinery, bank safes and vaults, water turbines, artificial teeth, wall paper, roofing paper, pretzels, commercial auto bodies, auto-tire chains, and bakers' machinery. It is one of the country's leading cities in the production of cigars, and also has extensive manufactures of agricultural machinery, pianos, hosiery, silk, furniture, pottery products, stained glass windows, lime, wire cloth, heating systems, cement, and garage equipment. Hydroelectric power is furnished by two developments on the Susquehanna River 13

miles distant and there is a large local steam plant.

The educational institutions include York Collegiate Institute (coeducational, preparatory), and York County Academy, founded in 1787. The high school offers an industrial course which is cooperative with the industries, pupils spending two weeks in school and one in the shop.

Penn Commons, deeded to the city by the sons of William Penn, and Farguhar Park are attractive parks, and there are a number of playgrounds.

The first permanent settlement was made in 1741 by Thomas Cookson, a surveyor for Richard and Thomas Penn, then the proprietors of the colony, and was named after York, England. In the old courthouse here the Continental Congress sat from Sept. 30, 1777, to June 27, 1778, having left Philadelphia on the approach of the British. York was incorporated as a borough in 1787 and as a city in 1887. Population 49,400.

York, Alvin C. (1887-), a famous hero of the World War, born in Fenetres Co., Tenn. In the Argonne, Oct. 8, 1918, single-handed and armed only with rifle and an automatic revolver, he captured Hill 240, killed 20 of the enemy, and compelled the surrender of 132 Germans. As a reward for his feat he was awarded a Medal of Honor by the United States, other medals by Italy and Montenegro, and a Croix de Guerre by General Foch personally. When he returned to the United States, Corporal York founded the Alvin C. York Industrial Institute, a vocational high school for mountain children, which opened in 1926.

York, House of, a royal family descended from Edmund de Langley, fifth son of Edward III and first Duke of York. His first son, Edward, died at Agincourt, and his second son, Richard, was beheaded for having plotted against Henry V. Richard had married Anne Mortimer, heiress of Clarence, third son of Edward III, whose rights to the English throne had been set aside by the House of Lancaster. Their son Richard claimed the crown, and thus the Wars of the Roses began, the House of York having as a symbol the White

Rose, and the House of Lancaster, the Red Rose. Richard was killed at the Battle of Wakefield, but his son gained the power as Edward IV, and another son, Richard, Duke of Gloucester, reigned as Richard III after he had killed the two young sons of Edward IV. Richard was defeated by Henry Tudor of the House of Lancaster, who reigned as Henry VII. He married Elizabeth, the daughter of Edward IV, and thus united the two families. As a further precaution he had Edward, Count of Warwick, the last male descendant of the House of York, beheaded in 1499.

York'town, Sieges of, two famous sieges at Yorktown, Va. The more important one, 1781, practically ended the Revolutionary War.

After his failure in the Carolinas, Cornwallis had been pushed into Virginia by Greene. There he was harassed by Lafayette, who had been joined by Wayne and by Steuben. He finally stationed himself at Yorktown, where deep water surrounded three sides of his position and a narrow strip of land projected out in its front. Lafayette was too weak to risk an engagement, but he stationed himself at Malvern Hill, where he could watch the British quarters. On Aug. 31 a powerful French fleet of over 30 ships, under Count de Grasse, reached the mouth of the York River. The British fleet from New York, under Graves, engaged it on Sept. 5; but the French were victorious after a hard contest which lasted two hours. They then closed in behind Cornwallis, blocking his escape by sea. In the meanwhile, Aug. 19, Washington had left the Hudson Valley with 2000 Continentals and 4000 French under Rochambeau. Sept 18 he reached Yorktown, a distance of 400 m., completing the blockade of that place and increasing the American force to some 16,000 men. A number of gallant but ineffectual sorties took place, and Cornwallis raised the white flag on Oct. 17. On Oct. 19 he formally surrendered 7247 soldiers, 840 seamen and a large number of guns. This event is commemorated by a handsome monument.

Yosemite, *Yo sem' i te*, Valley, a famous deep valley or gorge in the Sierra Nevada Mountains in Mariposa County, Cal., about 150 m. e. of San Francisco. It is about seven m. long and from a half to one mile wide and is traversed roughly from east to west by the Merced River. On both sides of the Merced rise perpendicular heights of granite—Cathedral Rocks, 2,591 ft.; El Capitan,

3,604 ft.; Sentinal Dome, 4,157 ft.; Half Dome, 4,892 ft.; Clouds Rest, 5,964 ft., and others. Of the waterfalls tumbling over the sheer walls of the valley, the most celebrated are the Yosemite, which drops 1,430 ft., while the Lower Yosemite, just below, drops 320 ft.; Bridalveil, 620 ft.; Ribbon, 1,612 ft.; Nevada, 594 ft.; Vernal, 317 ft.; and Illilouette, 370 ft. Mirror Lake is a beautiful sheet of water in the eastern part of the valley. Yosemite Valley was discovered in 1851 by mining prospectors, and in 1864 Congress gave it to California under the condition that it be kept open as a public park. In 1890 the Yosemite National Park, including the valley, was established, and in 1905 the original reservation was ceded back to the federal government by the state. The park is 1,125 sq. m. in area and includes several groves of the famous big trees (sequoias), among them the Mariposa Grove. The Grand Canyon of the Tuolumne River and its valley, the Hetch Hetchy, as well as its Waterwheel Falls, with their "wheel-like whirls," are other beautiful and interesting features of the park.

Yoshihito (1879-1926), Emperor of Japan, the son of the late Emperor Meiji, born in Tokyo, and educated in the Peers' School. On his eighth birthday he was proclaimed heir apparent and on Nov. 3, 1889, he was declared Imperial Crown Prince. From this time until he acceded to the throne of Japan as mikado on the death of his father, July 30, 1912, he held various high ranks in the army and navy. He spent years in travel and study throughout his kingdom, had a thorough understanding of conditions and was broad-minded, generous, and democratic.

Young, Brigham (1801-1877). Second president of the Church of Jesus Christ of Latter-day Saints (1844-77), Brigham Young led the Mormon people in their exodus from Nauvoo, Ill., to the Great Salt Lake Valley and located the first settlements there (1847-48). He was born at Whitingham, Vt., and removed in his youth to western New York, where he was a builder, painter, and glazier. In his younger years he was a Baptist, but in 1832 he joined the Mormons and removed to Kirtland, Ohio. He was made one of the Twelve Apostles in 1835 and performed extensive preaching missions. When Joseph Smith was lynched in

1844, he succeeded him as president.

His career in colonizing Utah and the neighboring territories distinguished him as a strong man of great foresight and executive ability. He was the first governor of the Territory of Utah (1850-58). He built towns, irrigation works, railways, and manufactures; established great mercantile and banking institutions and schools, and directed the world-wide missionary labors of the Mormons. The social system of the Mormons, embracing a plurality of wives, was practiced during his regime and became the conspicuous feature. To his prowess as a commonwealth builder is due the marvelous transformation of a desert region into a wonderfully beautiful and prosperous state.

Young, Charles Augustus (1834-1908), an American teacher and astronomer, born in Hanover, N. H. He graduated from Dartmouth College in 1853; taught the classics in Phillips Academy, Andover, for three years, and astronomy, natural philosophy and mathematics in Western Reserve College, Ohio. He served for three months in the Civil War and at the close of the war accepted the chair of physics and astronomy at Dartmouth College. He was one of the Winlock company who went to Jerez, Spain, for the purpose of observing the total eclipse of the sun in 1870, and his observations at that time were exceedingly important. In 1877 he accepted the chair of astronomy at Princeton, which he filled for about a quarter of a century. During this time his work, particularly in the observation and study of the sun, was of immense value to the scientific world.

Young, Edward (1683-1765), an English poet, born in Upham, Hampshire, and educated at Winchester School and at Oxford. He became chaplain to the King in 1728 and rector of Welwyn two years later. In 1742-45 appeared the famous *Night Thoughts on Life, Death and Immortality*, a series of poems on which his reputation rests almost entirely. The *Night Thoughts* are a series of reflections upon the temporary nature and uncertainties of life, in which the poet dwells with gloomy magnificence upon death and the tomb. There are, however, some fine imaginative passages,

and a number of sayings that have become popular, notably the familiar "Procrastination is the thief of time." Young belongs to the group of poets who formed the vanguard of the movement which culminated in Wordsworth and Coleridge.

Young, Ella Flagg (1845-1918), an American educator, and the first woman to become superintendent of schools in so large a city as Chicago. She was born in Buffalo. After her graduation from a Chicago high school and from the city training school, she began teaching at the age of 17. In 1868 she married William Young but continued her work as a teacher. She received the degree of Ph. D. from the University of Chicago in 1900; and in 1899 resigned the district superintendency of schools to become professor of education in the University of Chicago. In 1905 she was made principal of the Chicago Normal School; and in 1909 was unanimously elected superintendent of the public schools of Chicago. Mrs. Young served as president of the National Education Association in 1910, being the first woman to hold that position. She has been a member of the Illinois State Board of Education since 1888. She has been a frequent contributor to school journals edited *The Educational Bi-Monthly* from 1906 to 1909; and has written *Isolation in the School, Ethics in the School and Some Types of Modern Educational Theory*.

Young Men's Christian Association an organization of Christian men for Christian work among young men. The movement was decidedly evangelistic in its beginning in America, in the middle of the 19th century. The movement began earlier in England, the first organization being founded by Sir George Williams in London in 1844. While still retaining many evangelistic features, the Association has added classes for Bible study and for the study of practical, secular branches. It has also added athletics. In many of the large towns and cities, the Association owns buildings which are fully equipped with reading rooms, class

rooms, gymnasiums, baths and parlors for games. The Association has been extended to nearly all the towns and cities of the United States and Canada, and to cities throughout the world. Its members are of two classes, active and associate. The active members are members of evangelical churches, and they alone may hold office and vote. Branches of the Association are known as the Railroad Y. M. C. A. and the College Y. M. C. A.

Youngstown, Ohio, a city and county seat of Mahoning Co., 66 m. s.e. of Cleveland, on the Mahoning River, on the Pennsylvania and Ohio Canal and on the Erie, the Baltimore & Ohio, the Pennsylvania, the Lake Shore & Michigan Southern, the Pittsburgh & Lake Erie and other railroads. There is excellent street railway service, and a number of interurban lines connect the city with East Liverpool and the surrounding towns and cities. The city is primarily an industrial center and has vast iron and steel interests. Natural gas furnishes domestic fuel. Youngstown has over 100 m. of streets and boulevards. The finest residential streets are broad and handsomely shaded, with well-kept lawns and gardens. The only public park within the city is Wick Park of 47 acres, near the northern limits and named for the donors. Other parks include Mill Creek, of 457 acres of great natural beauty, Idora, Belmont and Calvary parks. The business district lies in the valley on the north of the river and the residential districts in the near-by hills. The noteworthy buildings include a courthouse, the Federal Court-house, Y. M. C. A. Building, Park Theater, Dollar Savings and Trust Company Building, and Elks' and Odd Fellows' buildings. There are a number of banks and about 50 churches.

The educational institutions include the Rayen School, founded by Judge William Rayen, which is conducted as the city high school, McMillan Free Library, public and parochial schools, Lucretia K. Baldwin Memorial Kindergarten and several private schools.

The benevolent institutions include the city and Mahoning Valley hospitals, Children's Home, and Florence Crittenton Home. Manufactures are extensive. Pop., 1920, 132,358; est., 1925, 159,970.

Young Women's Christian Association, an organization of Christian women for work among young women. The work is practically the same as that of the Y. M. C. A. The international organization was founded several years later than that of the Y. M. C. A., and is not so widely extended nor so well equipped. Its growth, however, is steady and its organization and influence extend throughout the civilized world. Its work has the fourfold aim of ministering to the physical, social, mental and religious needs of young women. See YOUNG MEN'S CHRISTIAN ASSOCIATION.

Yuan' Shih'-Kai', a Chinese statesman, second provisional president of the Chinese Republic, born in Chengchau, in the Province of Honan. After a somewhat unpromising boyhood, at the age of 19 he ran away to Tientsin, where his uncle held a government position. Sent by his uncle to Wu Changching, viceroy of Shantung, the boy became a member of that official's family, entered the army and, as a petty military officer, accompanied his chief to Korea. Here the young man's remarkable progress in understanding Korean politics won him the favor of the then powerful Li Hung Chang, who appointed him resident-commissioner of trade in Korea. At the close of the Chino-Japanese War of 1894-5, which Yuan is said to have partly brought on, he fell into disfavor with Li Hung Chang, but only temporarily, and soon the young man was appointed to superintend the organization of the new army, a task accomplished with conspicuous success. From now on his progress was rapid. The Dowager Empress made him acting governor of Shantung in 1899, and the following year, governor of the province. During the Boxer uprising Yuan won the esteem of foreigners in China and elsewhere.

By 1906 he was regarded the strongest man in China. He undertook to bring about reforms and to introduce Western ideas in Chinese affairs. The court party, however, became hostile to him, and in 1909 he was dismissed from office. In 1911 when the revolution in China began to make headway, Yuan accepted the premiership of the empire, but was unable to suppress the revolution. In February, 1912, when the Chinese monarchy was overthrown by the revolutionists, the Nanking assembly elected Yuan provisional president of the Chinese republic, and accepted the resignation of Dr. Sun Yat-Sen, and in October, 1913, Yuan was elected permanent president. In 1915 a movement was inaugurated to restore the monarchy with Yuan Shih-Kai as emperor. Elections were called to vote on the restoration, and it was voted, but postponed owing to opposition. A number of provinces revolted; troops sent to put down the revolt made little headway, when Yuan Shih-Kai died suddenly June 6, 1916.

Yucatan, *Yoo" kah tahn'*, a peninsula of southern Mexico having indefinite limits but lying between the Gulf of Campeche and the Caribbean Sea. It is separated from Cuba by the Yucatan Channel, which connects the Gulf of Mexico and the Caribbean Sea. The peninsula is almost entirely a low plain, probably in no part more than 500 ft. above sea level. It has few streams and is, in general, covered by scrubby vegetation. Yucatan has many remarkable ruins of temples, pyramids and cities, and the State of Yucatan is the northernmost peninsula. Merida, in the western part, is its capital, and Progreso is its chief port.

Yucca, *Yuk'a*, a Southern and Western plant of the Lily Family probably native in Santo Domingo. Some species are also known in the Gulf and Atlantic states, and farther north it is found in cultivation. It is a stemless plant with a cluster of stiff, swordlike leaves which curve from a central point from which rises a long flower stalk bearing clusters

of nodding or spreading white flowers. Yucca leaves are used by the Indians in making baskets, rope, etc., and the Mexicans made a drink from the juice. The Spanish dagger, Spanish bayonet, and bear grass are species known in Florida and cultivated farther north.

Yugoslavia. See JUGOSLAVIA.

Yukon, the extreme northwestern territory of Canada, with an area of 207,076 sq. m., of which 649 are water. The entire country is mountainous with rolling hills penetrated by navigable rivers. The mountains are noted for their scenic grandeur, and glacial extent, the loftiest peak being Mount Logan (19,539 ft.), close to the Alaskan boundary adjacent to Mount St. Elias. The chief rivers are tributaries of the Yukon which rises in the southeast. Yukon is one of the coldest regions in the world. Frost occurs every month in the year, and the summers are short and damp.

Oats, barley, rye, flax, potatoes, turnips and other garden vegetables are raised, and wild fruits such as bilberry, bearberry, bog apple and highbush cranberry are plentiful. Parts of the territory are wooded with fair-sized timber, white and black spruce being the most important trees. The discovery of gold in 1896 attracted thousands but since 1913 gold production has gradually fallen. Coal, copper, and silver are mined. Moose, caribou and sheep abound in most localities, and marten, wolverines, lynx, ermine, and fox are the chief fur-bearing animals. In 1898 the district was organized as a separate territory, which is represented in the Canadian House of Commons by one member. Justice is administered by the Northwest Mounted Police. A railway crossing the White Pass operates between Skagway and the upper water of the Yukon. Dawson is the capital. Population, 5,000.

Yukon River, a river situated in Yukon Territory, Canada, and in Alaska and one of the largest streams in North America. It rises in the west-central part of the Yukon District and flows northwest into Alaska and thence southwest into Bering Sea, a distance of about 2200 m. Its tributaries are the outlets of lakes and marshes and include the Lewes, Klondike, Forty Mile Creek, Porcupine and other rivers. It is divided into two navigable sections, White Horse Rapids being the dividing line, and there is regular navigation from June to October over 3000 m. of the Yukon and its tributaries.

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ZAGHLUL, Saad Pasha (1856-), an Egyptian Nationalist leader and premier. Education in Egypt made rapid strides forward under his administration as minister of education. After the Armistice of 1918, being refused permission to go to London to plead for recognition of Egyptian independence, he became so hostile in his attitude that he was deported to Malta. This action led to outbreaks in which many persons were killed. Later he was released and permitted to go to London. When, in 1922, the British declared Egypt independent "with reserved points," Zaghlul and his followers demanded complete independence, and in the election of January, 1924, they received a large majority and Zaghlul became premier. He was forced to resign the same year due to his uncompromising attitude on the question of evacuation of the Sudan, coupled with the assassination of Sir Lee Stack, the sirdar.

Zagreb, or **Agram**, **Jugoslavia**, the second city in the kingdom and its financial and commercial center, situated 80 miles northeast of Fiume, between the mountains and the Save River. The modern section, with tall buildings and wide streets, occupies a narrow tract between the levels along the river and the ridge on which the old town, with its narrow, winding streets, is situated. It is the see of a Roman Catholic archbishop and has a Gothic cathedral dating from the 15th century. It also has a large university. The leading industries are the manufacture of linen, leather, and tobacco. Zagreb was founded in 1094 by Ladislaus I, of Hungary, as the seat of a bishop. Destroyed by the Tatars, in 1242, it was rebuilt and made a royal free city. In 1867 it became the capital of Croatia-Slavonia. Once the center of the Jugo-

slav movement, it is now Croat in sympathy. Population, 130,000.

Zalinski, Edmund Louis Gray (1849-1909), an American soldier and inventor, born in Poland. He came to America in 1853 and in the Civil War served in the Union Army. In 1887 he became captain of artillery. He invented a dynamite gun, trenching tool, and ramrod bayonet and originated telescopic sight for artillery and a system of range and position finding for artillery firing.

Zambesi, *Zam be'ze*, or **Zambezi**, the fourth largest river of Africa. It rises on the boundary between the Belgian Congo and Angola and flows southeast in a double curve to form the letter S, emptying into Mozambique Channel through a number of deltas after a course of 1,650 miles. It traverses Rhodesia and Portuguese East Africa. Its shores are alternately grassy plains, narrow, forest-clad ridges, and rocky gorges; it has many rapids, Victoria Falls being the greatest waterfall in the world (See VICTORIA FALLS). It is navigable for a distance of 400 miles from its mouth. Livingstone first explored its upper course in 1854-55.

Zanesville, Ohio, an industrial center and the county seat of Muskingum County, 58 miles east of Columbus, on the Muskingum River at the mouth of the Licking River, and on the Pennsylvania, the Baltimore & Ohio, the New York Central, and the Wheeling & Lake Erie railroads. The Muskingum has been made navigable to the Ohio River and there are packet service to Pittsburgh and Parkersburg and summer steamboat excursions. Zanesville lies in a fertile agricultural district and in a region rich in coal, sand and gravel, natural gas, and oil. The city's two rivers are crossed by a number of bridges, the most notable being the

concrete Y bridge, a three ended bridge, across the Muskingum.

Zanesville's manufactures of floor and wall tile and art pottery are among the largest in the world. Table china, stoneware, building tile, and brick are other important clay products. Glass containers and cement are produced in large quantities and other leading products include sheet steel products, wrought steel tubes and pipes, radiators and boilers, general castings, stoves, farm implements, refrigerating machines, and packed meat. There are also extensive car shops. Power is supplied by a large steam plant on the Muskingum. Zanesville is also a wholesale center for a large variety of products.

Among the benevolent institutions are the McIntire and the Avondale children's homes, a day nursery, and a convalescent home for crippled children.

The town was laid out by Ebenezer Zane in 1800, and was first named Westbourne. In 1804, it became the county seat. It was the state capital in 1810-12. A city charter was granted in 1850. Population, 30,600.

Zangwill, *Sang' wil*, Israel (1864-1926), a Jewish novelist and man of letters born in London. He studied in the East End of London, graduated from London University, and after teaching for a short time ventured into journalism. As a lecturer he made tours in Holland, Ireland, Palestine and the United States. He depicted Jewish scenes and characters with great ability and wrote convincing studies of Ghetto life. He was an advocate of Zionism and was the founder of the International Jewish Territorial Organization. His works include *Without Prejudice*, *The Premier and the Painter*, *The Big Bow Mystery*, *Ghetto Comedies*, *Children of the Ghetto*, *Dreamers of the Ghetto*, *They That Walk in Darkness* and *The Mantle of Elijah*. One of his best dramas, of which several have been produced in New York, is *The Melting Pot*.

Zanzibar, *Zahn'' zi bahr'*, a British protectorate and a sultanate of East

Africa, consisting of the islands of Zanzibar (640 sq.m.) and Pemba (380 sq. m.) and the adjacent small islands in the Indian Ocean off the coast of Tanganyika. Arabs are the principal landlords and the blacks are chiefly Swahilis. The islands yield the bulk of the world's supply of cloves. Coconuts are extensively cultivated and copra is exported. The manufactures are pottery, rope, soap, oil, jewelry, and mats. Zanzibar, the capital city (pop. 38,700), is a fine port. Population of Zanzibar Island, 129,000; of Pemba, 89,000; non-native, 15,000 (280 Europeans and 12,000 British Indian subjects).

Ze'bra, an African member of the Horse Family found wild in the plains, mountains and forests. It differs from the horse only in color of its coat, which is light buff striped with reddish-brown marks that extend around the body and horizontally about the legs. The zebra has a round, plump body, is generally somewhat smaller than the horse, and is said to have a vicious temper until tamed. Zebras travel in herds of 100 or more and are shy creatures unless attacked.

Ze'bu, or **Indian Ox**, a domesticated member of the Bovine Family, found in Africa and India. It is a large, powerful animal, resembling the ox but having upon its shoulders a large, unsymmetrical hump. Its face is peaceful in expression; upon the forehead are two short, backward-pointed horns, and beneath the chin is a large dewlap. The zebu is used as a beast of burden and of transportation and aids the farmer in tilling his fields. The flesh, particularly that of the hump, which contains a large per cent of fat, is of good quality. Like the members of this same family in the United States, the zebu is known in many colors, but the most common variety is creamy or gray-white. A small variety of zebu, scarcely larger than a Newfoundland dog, is known in Abyssinia; both species were once the object of veneration among the Hindus.

Zechariah, *Zek'' a ri' a*, a book of the Old Testament, whose author, Zecha-

riah, was the 11th of the 12 minor Hebrew prophets. He began to prophesy two months after Haggai, 520 B. C., continuing for two years to encourage the Jews to complete the rebuilding of their Temple. The book of *Zechariah* is full of allusions to the coming of the Messiah and contains the history of the Jews and of the Church to the final judgment. See BIBLE, subhead *The Old Testament*.

Zeisler, Zise' ler, Fannie Bloomfield (1863-1927), a celebrated pianist, born in Austria. When very young she moved with her parents to Chicago, where she studied with Bernard Ziehn and Carl Wolfsohn. Afterwards she studied for five years under Leschetizky at Vienna. She made many concert tours through the United States and Europe and was the recipient of distinguished honors at home and abroad, being acclaimed one of the greatest of living pianists. In 1925 she celebrated the fiftieth anniversary of her appearance on the concert stage by establishing the Fannie Bloomfield Zeisler fund for needy musicians.

Zend-Aves'ta, the sacred book of the followers of Zoroaster, still used by the Parsees as their bible and prayer book. The meaning of the word *Avesta* is obscure; *Zend* signifies interpretation. No other document written in the language of the Zend-Avesta is extant, and the origin of this language can only be conjectured. This book consists of five parts, including liturgy, the priestly code, songs of praise and prayers. The Zend-Avesta is only a fragmentary remnant of a much more extensive group of sacred writings. It occupies an important position in the world's literature, however, as the only literary monument of ancient Iran. It was first translated in 1771, by a French Orientalist, Anquetil-Duperron. See ZOROASTRIANISM; PARSEES.

Ze'no, the founder of the Stoic philosophy, born at Citium in the Island of Cyprus. The dates of his birth and death are not definitely known, but he probably lived in the latter part of the

fourth and the first part of the third century B. C. He was of Phœnician ancestry and was in early life a merchant. Losing his property by shipwreck, he took refuge in philosophy, for which he had also a natural inclination. At first he was a pupil of the Cynic Crates, then of Stilpo, and afterwards of Polemo of the Academy. After 20 years he became convinced of the necessity of a new philosophy, and began to teach at Athens (about 310 B. C.) in the "painted porch" of the market place (Greek *stoa*, hence *stoicism*, as his philosophy was called). Here he is said to have taught for 58 years, dying at a very old age. See STOICISM.

Zeno'bia, Queen of Palmyra. She succeeded (267) to the throne as regent for her son when her husband, Odenathus, was assassinated by his nephew. Nearly all the Eastern provinces submitted to her, but when Aurelian became Roman emperor in 270, he marched against her, and, having defeated her in several engagements, captured Palmyra. Zenobia attempted flight, but was made a prisoner. Decked with jewels and almost sinking under her heavy golden chains, she was led in triumph at Rome, but she received from her captor vast estates near Trivoli, where she passed her latter days in splendor.

Zephaniah, Zef' a ni' a, a book of the Old Testament. Its author, the ninth of the 12 minor Hebrew prophets, prophesied at the beginning of Josiah's reign, about 642 B. C. The book, which is in three chapters, contains: the judgment of Judah and its causes; a call to repentance, with a promise of restoration; reproof of Jerusalem and the iniquity of its people; promises of the restoration of the people and destruction of their enemies. See BIBLE, subhead *The Old Testament*.

Zeppelin, Tsep' e leen', Ferdinand, COUNT VON (1838-1917), a German inventor and soldier. He took part in the Franco-German War and rose to the rank of lieutenant-general in the army. He became well known for his experiments in connection with the dirigible

balloon, in which he made his first ascent in July, 1892, and which, by 1900, he had so perfected that he held it successfully against a seven-mile wind. Misfortune, however, attended his further experiments for a number of years, but in 1907 he began to take first rank as a constructor of dirigibles, and three years later his *Deutschland*, carrying 33 passengers, made its initial voyage from Friedrichshafen to Düsseldorf. Several of his balloons then began to ply regularly between certain German cities. See AERONAUTICS, subhead *Dirigible Balloon*.

Zinc, or *Spel'ter*, a bluish-white metal seven times heavier than water, somewhat resembling lead in appearance. It is hard, tough and brittle, but becomes malleable and ductile under high temperatures, and may be hammered or rolled into sheets or drawn out into wire. The chief ores of zinc are zinc blende, or sphalerite, and the carbonate, or calamine. They are widely distributed and occur in Austria, Germany, Belgium, Italy and parts of the United States, where the chief source of supply is Joplin, Mo., which is also the center of the American zinc industry. Valuable deposits, however, occur in Wisconsin, New Jersey and other states. The treatment of zinc ores consists of three distinct operations: first, concentration of the ore to remove the bulk of impurities; second, roasting of the concentrated ore and converting it into zinc oxide; third, reduction and distillation of the zinc vapor. Oxide of zinc is reduced to a metallic state by heating with charcoal; pure calamine and pure red zinc ore are directly reducible by charcoal, but zinc blende is converted into oxide only by roasting.

The uses of zinc are numerous and important. It is extensively employed for galvanizing sheets of iron for roofing and iron wire for telegraphing (See GALVANIZED IRON). In the production of zinc, the ore is first crushed and washed on concentrating tables to remove the bulk of the impurities. The ore is then converted into zinc oxide by roasting. The oxide is heated in retorts with charcoal, and the pure metal passes

off in the form of vapor, which is converted into molten zinc in cooling chambers. The molten metal is drawn off from time to time and cast into bars ready for the market. The sulphur gases expelled in roasting ore containing sulphur are utilized in the manufacture of sulphuric acid. Zinc plates are used in the construction of electric batteries, for lining tanks and protecting wood surfaces from heat. As a chemical reagent it is also of value. Zinc dust is used as a reducing agent and in the precipitation of gold. Alloyed with copper it produces brass, and with copper and nickel it is used in the manufacture of German silver, bronze and other alloys. Its compounds are used in dyeing and printing; in the manufacture of varnishes and drying oils; and in the preparation of zinc white, a nearly white solid, valuable as a pigment. Zinc oxide is important in medicine as the source of bromide and iodide, and zinc sulphate, or white vitriol, is used as an astringent. Zinc chloride is powerfully caustic, while the disinfecting and deodorizing properties of certain salts render them of great value for these purposes.

Zinc sulphate, or white vitriol, is a well-known compound of zinc used in dyeing and in medicine. It is obtained by dissolving zinc in sulphuric acid or by roasting certain zinc ores. It forms white crystals which, when found native, are known as goslarite.

Zinc Etch'ing, a process and method of preparing plates for printing by reproducing designs or pictures from a drawing. The drawing is first made in black ink on white paper, or it may consist of a print. After photographing this drawing or print, the photograph is reversed on a sensitized plate, after which the negative is developed on a zinc plate, which is prepared in the following manner: A thin coating is made of wax or any suitable material not affected by acid, and with a sharp instrument the design is traced, exposing the metal in all the lines it touches. Dilute acid is now poured over the surface and it corrodes, or cuts, into the zinc plate

when the covering has been removed by the graver. The acid and the coating are cleaned off and the plate mounted on a block of wood type-high ready for printing. The quickness and cheapness of this process make it desirable for newspaper printing and work not carrying fine shadows. The best results are obtained when special drawings are made for the illustration. See **HALF TONE**; **PHOTOGRAPHY**.

Zinc White, a compound of zinc used for white paint, principally for interior finishing. It is made by roasting zinc ore in connection with anthracite and a jet of air. The zinc white forms as a powder and is collected on coarse cloths. Mixed with linseed oil, it is put on the market as a white paint. This paint is not suitable for outdoor painting, because it will not stand the action of the weather. See **PAINT**.

Zi'on, the acropolis of the Jebusites, taken by David and made his residence (*II Sam. v, 6-9*; *I Chron. xi, 4-8*). It is not known on which of the two hills of Jerusalem Zion was located. Zion in later times became synonymous with Jerusalem. The term *Daughter of Zion* means the Jewish people. See **JERUSALEM**.

Zionist Movement, a movement which has for its object "the creation of a home secured by public rights for those Jews who cannot or will not be assimilated by the country of their adoption." For centuries it has been the dream of orthodox Jews to return to the Holy Land as a nation under the leadership of the Messiah promised in the Old Testament. The movement for the restoration of the Jewish state assumed an important position in 1897 when the first Zionist Congress met in Basel, Switzerland, where gathered 200 delegates representing Jews of all nationalities. This assembly was the result of a pamphlet issued in 1896 by Dr. Theodore Herzl, *The Jewish State*, which proposed the establishment of a Jewish state under Turkish suzerainty, in Palestine. This pamphlet created a great sensation and really inaugurated the present Zionist

Movement. Congresses were again held in 1899, 1900, 1901 and 1903, but the death of Dr. Herzl in 1904 was a great blow to the cause. Following the World War, Great Britain, who had declared in favor of a Jewish National home in Palestine, was given a mandate for Palestine. Sir Herbert Samuel, an English Jew of Zionist sympathies, was appointed High Commissioner, and in 1922 a constitution was promulgated, which provided for Jewish representation on the legislative council. Jewish colonization, which had been interrupted by the war, continued at an increasing rate.

Zith'er, a musical instrument known to the Greeks as cithara. The zither is a flat stringed instrument and consists of a resonance box with a circular sound-hole and 32 or more strings. Five tuned strings are stretched over a fretted keyboard and are used to play the melody. The remainder are called the accompaniment strings. There have been various modifications of the zither, among them being the double zither and the bow zither.

Zodiac, *Zo' di ak*, a belt or zone in the celestial sphere which includes the paths of the sun, moon and planets extending an equal distance on each side of a great circle in the plane of the ecliptic. Centuries ago the zodiac was divided into 12 divisions, each containing a constellation. For convenience, these divisions are designated by the signs of the constellations, as follows: Aries (♈), the Ram; Taurus (♉), the Bull; Gemini (♊), the Twins; Cancer (♋), the Crab; Leo (♌), the Lion; Virgo (♍), the Virgin; Libra (♎), the Balance; Scorpio (♏), the Scorpion; Sagittarius (♐), the Archer; Capricornus (♑), the Goat; Aquarius (♒), the Waterman; Pisces (♓), the Fishes. Owing to the precession of the equinoxes, however, the signs and the constellations do not now coincide, the sign Aries lying in the constellation Pisces; the sign Pisces in the constellation Aquarius; and so on around the circle. See **CELESTIAL SPHERE**; **CONSTELLATIONS**; **PRECESSION OF EQUINOXES**.

Zodiacal, *Zo di' a kal*, **Light**, a faint cone of light from the sun seen after twilight in the evenings of spring, or before twilight in the mornings of autumn. The cause of this light is not certainly known, but it is probably from an envelope of very rare matter surrounding the sun. This attenuated matter seems to have a lens-shaped form with the sun in the center. See **ZODIAC**; **SUN**.

Zo'la, **Émile Edouard Charles Antoine** (1840-1902), a French novelist, born in Paris. His mother was a Frenchwoman and in his father's veins was a mixture of Greek and Italian blood. He studied at Paris and Marseilles but failed to get a degree, and in 1862 obtained a clerkship in the publishing house of Hachette. His early writings were mediocre, and the first volume of the series which he planned to write, and called *The Physiological History of a Family under the Second Empire*, met with no great success. The family in question was given the name of Rougon-Macquart. In 1878, the seventh volume, *L'assommoir*, appeared and the author's fortune was made, edition after edition being demanded by the public. This vivid epic of drink was a powerful picture of life among the working classes in Paris. About 20 volumes in all completed the series, and other notable novels included *Nana*, *The Downfall*, *Doctor Pascal*, *Money*, *Germinal* and *La Terre*. He also wrote the three romances, *Lourdes*, *Rome* and *Paris*, and the "gospels" of *Population*, *Work*, *Truth* and *Justice* (the last being left incomplete by his accidental death). After 1898 he vigorously defended Alfred Dreyfus, his letter *J'accuse* demanding punishment of the real criminals, and the freedom of Dreyfus, whom he fully believed to be innocent. This letter brought him to trial, he was declared guilty and lived for a time as an exile of France. In all his work Zola professed to be a realist, or a naturalist, unnecessarily emphasizing men's greed and lust and evil passions, and presenting pictures upon pictures of gloomy horrors and despairing ugliness and misery.

Zollverein, *Tsol' fer ine'*, a German word meaning customs union, and first applied to the commercial compacts made between Prussia and other German states in 1833. The chief terms of these compacts were that the states should adopt a common tariff and that all duties which had been levied on goods from the other states in the compact should be abandoned. It was a long step toward the unification of the German Empire. In general, the northern states favored import duties on foreign trade for revenue only, while the southern states favored a protective tariff. The war with Austria in 1866 put an end to this agreement, and in the new union, formed in 1867, Prussia had the greatest influence. When the German Empire was finally consolidated in 1871, an article in the new constitution stated that the territory of the Zollverein was, with few exceptions, to be the same as that of the empire.

Zone, in geography, a climatic belt. There are five zones, or arbitrary divisions of the earth's surface, which lie within boundaries parallel to the equator. They are named according to the mean temperature of each as follows: the torrid zone, included between the parallels 23° 28' north and 23° 28' south; the polar, or frigid, zones, extending from the poles to parallels 66° 32' north and south; and the temperate zones, lying between the torrid and polar zones. The torrid zone is practically 47° wide. The temperate zones are 43° wide, and the frigid zones, 23°, 28'. See **CLIMATE**.

Zoological, *Zo" o loj' i kal*, **Garden**, a park with buildings for the confinement of animals from all parts of the world. Such parks, "zoos" or menageries are among the great educational advantages of modern times, for they give to children especially, but also to all visitors first-hand information concerning the animal inhabitants of all countries or all sections of one's own country. The most complete gardens are permanent establishments with arrangements for caring for Arctic and tropical animals under conditions as nearly like those of

their native haunts as possible, and with an especial building for fish, called an aquarium, one for birds, an aviary (See AVIARY), and one for monkeys.

The educational advantages of such gardens appealed earliest to the French, who, in 1793, established the Jardin des Plantes at Paris. This was first wholly botanical, but later a zoological department was added, which is at present among the largest and most complete in the world. Almost all the large cities of Europe have such zoos at present, and in connection with the majority there are museums, libraries and a regular corps of professors offering courses of study in the lines of work there represented.

In this respect the European gardens are generally ahead of those of America, which, though often remarkably equipped, considering the few years of their growth, do not offer the same advantages for study. The largest of such zoos in the United States are those of Central Park, New York City; Lincoln Park, Chicago; Rock Creek Park, Washington; and Fairmount Park, Philadelphia. A large and highly-equipped educational institution along special lines is the Aquarium of Detroit. Aside from these places where collections of animals are made, the United States maintains many national parks, which are also game preserves for the protection of the wild animals native to the regions of the parks. Notable among these are the Yellowstone National Park in Wyoming and Montana, the Yosemite National Park in California, the Casa Grande Park in Arizona and others of less extent in various parts of the country. For a discussion of European gardens, C. V. Peel's book *The Zoological Gardens of Europe* furnishes a readable guide to the traveler.

Zoology, *Zo ol' o jy*, that branch of Biology which has to do with animals. The subject may be studied purely scientifically as a series of principles or laws; it may be pursued as a branch of natural history simply for the thrill of learning about animals in their haunts; or it may become an applied science, as in animal

husbandry or certain aspects of parasitology.

Many people the world over have succumbed to the fascinations of outdoor zoology. Many become bird lovers who revel in their studies of avian life and habits. Even larger numbers find in the study of insects a greater satisfaction than could be obtained from indoor amusements. Hunters of big game; photographers of wild life on land, in the water, in the air; museum experts who search remote lands for new and strange species; trappers and breeders of fur-bearing animals; students of crop and forest pests; experts on the animals that produce or transmit disease; artists who depict the life and activities of picturesque animal species; all these and others too numerous to mention are students of zoology.

WHAT THE STUDY OF ZOOLOGY HAS DONE FOR THE BENEFIT OF MANKIND. The study of anatomy was for a long time pursued only with the aid of lower animals, but this was followed by the study of human anatomy. The knowledge of anatomy is the basis of surgery and of medicine. In fact, the whole subject of scientific medicine is a branch of applied zoology. A knowledge of zoology was responsible for the control of malaria, yellow fever, sleeping sickness, and many other plagues of mankind. The improvement of domestic animals and the suppression of crop and forest pests depend upon a knowledge of zoological principles. The silk industry, fisheries, apiculture (the rearing of bees), the breeding of race horses, the whale-oil industry, and other special lines of zoological pursuit have enhanced the wealth and enriched the living conditions of countless millions of men. In addition to all this, the cultural value of nature study and of the problems and principles of life must be given full consideration.

SYSTEMATIC ZOOLOGY is that branch of the subject that deals with the classification of animals. Large numbers of experts concern themselves chiefly with the collection, naming, and classification of new species. While this is not the most

important branch of biology, it is of great value to all other lines of study, for unless one is able to classify a given species upon which he is working, it would be difficult for him to give any adequate account of his results that could be tested or confirmed. For our present purposes an account of the groupings of animals is of prime importance, for the layman wants to know first of all where each animal belongs in the system of groups.

CLASSIFICATION. The whole realm of living things is divided into two kingdoms: the Animal Kingdom and the Plant Kingdom. The Animal Kingdom is now usually subdivided into two subkingdoms, *Protozoa* and *Metazoa*, the first consisting of one-celled animals and the second of many-celled animals. Since all classification is made by man and simply for convenience in arranging animals in systematic order (really pigeon-holing them), it is not surprising that there is much difference of opinion as to the various grades of organisms and the rank of different divisions. The *phylum* is next in comprehensiveness to the subkingdom. Then come classes, orders, families, genera, species, varieties, races. There may be introduced intermediate groups if they seem necessary in order to express the facts. The object of classification is to express the relative degrees of blood relationship existing among animals of the present as well as those of the past. It is assumed that those most nearly alike are the most nearly related and that resemblance and kinship run parallel. Thus we can represent all animals in a system of branching arrangements like a great tree with one main trunk, several major branches, many minor branches, and a million terminal twigs. The main trunk would be the tree of life in general, the two chief branches the animal and plant kingdoms, while lesser branches would represent the phyla, the classes, the orders, etc.

A brief summary of the classification of animals is given below with especial emphasis upon the groups likely to be of greatest popular interest:

Subkingdom I. *Protozoa* (one-celled animals).

- Phylum I. *Rhizopoda*.
- Phylum II. *Mastigophora*.
- Phylum III. *Infusoria*.
- Phylum IV. *Sporozoa*.

Subkingdom II. *Metazoa* (many-celled animals).

- Phylum I. *Porifera* (sponges).
- Phylum II. *Coelentera* (hydra, jellyfishes).
- Phylum III. *Ctenophora* (comb jellies).
- Phylum IV. *Plateminthes* (flat worms).
- Phylum V. *Nemateminthes*, (round worms).

Phylum VI. *Echinoderma* (starfishes, etc.).

Phylum VII. *Annelida* (segmented worms).

Phylum VIII. *Mollusca* (snails, clams).

Phylum IX. *Arthropoda* (insects, crabs).

Phylum X. *Chordata* (vertebrates, etc.).

The most familiar phyla are the last three: *Mollusca*, *Arthropoda*, *Chordata*.

The *Mollusca* are the snails, clams, oysters, cuttlefishes, octopi, and many others. Besides being important as food they are especially interesting biologically because of their extraordinary antiquity. Many of the oldest fossils known, some over a hundred million years old, are those of mollusks.

The *Arthropoda* are noteworthy for their vast numbers of species. In all, there are known not far short of a million species of arthropods, the majority of which are insects. There are also many thousands of species of crustaceans (crayfishes, shrimps, water-fleas, crabs), large numbers of scorpions, spiders, centipedes, etc., all of which belong to this phylum.

The *Chordata* comprise the vertebrate or backboneed animals and several groups of related forms without backbones, but with the general characteristics of this group in other respects.

The *Vertebrates* proper are divided into six classes:

- Class I. *Cyclostomata* (round mouth eels).
- Class II. *Pisces* (true fishes).
- Class III. *Amphibia* (frogs, toads, etc.).
- Class IV. *Reptilia* (snakes, turtles).
- Class V. *Aves* (birds).
- Class VI. *Mammalia* (animals that suckle young).

The *Mammalia* are divided into four main divisions:

- Div. I. *Unguiculata* (clawed mammals).
- Div. II. *Primates* (flat nails, etc.).
- Div. III. *Ungulata* (hoofed mammals).
- Div. IV. *Cetacea* (whales).

The *Unguiculata* consist of a group of relatively primitive orders. The *Cetacea* are the most highly specialized, while the *Primates* and *Ungulata* are intermediate between the *Unguiculata* and the *Cetacea* in degree of specialization.

Man belongs to the division *Primates*. This order of mammals consists of several families: the lemurs, the New World monkeys, the Old World monkeys, the apes, and man.

Some of the other important orders of mammals are:

- Insectivora* (moles, shrews).
- Rodentia* (rats, rabbits, etc.)
- Carnivora* (flesh eaters) including—
 1. Cat family.
 2. Civet family.
 3. Hyena family.
 4. Dog family.
 5. Raccoon family.

6. Skunk family.
7. Bear family.
8. Sea-lion family.
9. Walrus family.
10. Seal family.
- Ungulata (hoofed mammals).
 - Even-toed Ungulates (swine, sheep, cattle).
 - Odd-toed Ungulates (horses, tapirs).
 - Elephants.
 - Dugongs and Manatees.
 - Coneys.
- Cetacea (whales and dolphins).
 - Toothed whales.
 - Whalebone whales.

DIVISIONS. We might first indicate that zoology, like any other science, may be divided into pure zoology and applied zoology. Under pure zoology we may distinguish the following branches:

- I. Morphology—the science of form or structure.
- II. Physiology—the science of function.
- III. Ecology—the science of the inter-relationship of the organism and the environment.
- IV. Distributional Zoology—including:
 - a. Paleontology—the science of ancient life, or that of the distribution of animals in time.
 - b. Zoogeography—the science of the distribution of animals in space.
- V. Taxonomy—the science of classification.
- VI. Genetics—the science of the origin of organisms.

Under applied zoology we distinguish such branches as animal husbandry, sanitation, medicine and surgery, eugenics, economic entomology.

HISTORY. The beginnings of zoology date back to the Greeks. Aristotle was an accomplished observer and was the first to state clearly a number of the most important generalizations underlying the subject. Linnaeus was the great classifier. Cuvier was the founder of scientific comparative anatomy. Harvey discovered the circulation of the blood and introduced the scientific method. Lamarck and Charles Darwin did much to establish the validity of the central theme of zoology, namely, the principle of organic evolution, now universally accepted by scientists. Other prominent zoologists of the past were Huxley, Weismann, Schwann, Malpighi, von Baer; while the names of Bateson, Wilson and Morgan rank very high today.

SOME LEADING GENERALIZATIONS. The guiding principle of zoology is the conception that all species of the present have been derived through an orderly process of change, involving adaptation to a changing environment, from simpler, less specialized ancestors of the remote past. This is the theory or principle of evolution. This concept explains and rationalizes a vast array of facts in nature and is contrary to none of these facts. The second great guiding principle is the cell principle, ac-

cording to which the unit of life is the cell, a tiny organized mass of living substance with a nucleus. Development consists of cell multiplication and differentiation; heredity is due to cell lineage from generation to generation. The third great principle is rather technical and involves the idea of the unity of the organism and the factors that make for the maintenance of individuality and definiteness of organization of parts to form a whole. It would be difficult to say much more about the scientific aspects of zoology without introducing technicalities.

POPULAR ASPECTS. Zoology, like other sciences, has its popular side. Nature study, involving the observation of habits and the collection of specimens, the taking of photographs of animals and plants in nature, the training of wild animals for exhibition purposes; these and many other non-scientific, but none the less worthy phases of the study of animals, contribute to the general popularity of the science itself. One should be warned, however, against the writings of so-called naturalists who narrate stories about animals that have all the intelligence and emotions of human beings. Such writings are merely entertaining as fiction. —*Horatio Hackett Newman.*

Zo'roas'ter (about 660—about 583 B. C.), a great religious teacher of the East, founder of the Magian, or Parsee, religion, the ancient religion of Persia prior to the introduction of Mohammedanism (See ZOROASTRIANISM). The Zend-Avesta is the sacred book of this religion (See ZEND-AVESTA). Zoroaster was a native of northwestern Persia; several cities are given as his birthplace. According to the tradition he spent the period between the ages of 15 and 30 in religious preparation, at the conclusion of which he received a revelation of the faith and came forth as an opponent of the old superstitious beliefs and heresies. It is believed that he traveled over much of Iran and that in his 42d year he converted King Vishtaspa. The modern followers of Zoroaster in India are known as Parsees or Parsis. See PARSEES.

Zo'roas'trianism, the ancient religion of Persia, named for its founder, Zoroaster. The terms *Magian* and *Parsee* are often applied to this religion, the former referring to the ancient priests, and the latter, to the modern adherents of Zoroastrianism. The chief teachings of this religion center about a belief in

dualism. Good and evil principles everywhere pervade the world, and between these two there is constant warfare. Ormazd, the good spirit, the supreme god of Iran, created the universe and rules it; Ahriman, the evil spirit, is ever in conflict with Ormazd, but man, being a free agent, will cause the final overthrow of evil by choosing what is right. To accomplish the triumph of the kingdom of righteousness was the end of all Zoroaster's teaching. This prophet also believed that there existed a heavenly hierarchy, headed by Ormazd, who was assisted by lesser divinities in administering the kingdom. Ahriman, he taught, was likewise the head of a vast host of lesser evil spirits, and the struggle between these two kingdoms is the history of the universe. His ethical teachings have as their essence the three principles, good thoughts, good words, good deeds. For modern Zoroastrians, see PARSEES.

Zuñi, *Zoo' nye*, a tribe of North American Indians inhabiting part of the New Mexico and Arizona region. The Zuñis are closely allied with the Pueblos in their ceremonial rites, and are peaceable and industrious and skilled in agriculture, pottery and weaving. There is but one tribe, numbering about 1500.

Zürich, *Zoo'rik*, the capital of the Swiss canton of the same name and the largest city in Switzerland, situated on the Limmat River at the northern end of Lake Zürich. The chief features of interest are the Grossmünster Church, of which Zwingli was pastor, a large number of other old churches, the Swiss National Museum, the largest library in Switzerland and several educational institutions. The silk-weaving industry is the most important. Others are cotton spinning and the manufacture of machinery and paper. Zürich marks the scene of the beginning of Zwingli's Reformation (See ZWINGLI, ULRICH). Population, about 208,000.

Zuyder Zee, *Zi' der Ze'*, or **Zuider Zee**, an arm of the North Sea, projecting into the northwestern coast of Netherlands. It encloses a total area of 2027 sq. m.

The outer portions are extremely shallow, due partly to the fact that it was once an inland sea. It is used so little for navigation that the government has begun to reclaim the inner sea.

Zwingli, *Tsving' le*, **Ulrich**, or **Huldreich** (1484-1531), the leader of the Protestant Reformation in Switzerland. He received an excellent education under the new humanistic methods at Vienna and Basel, and in 1506 became parish priest at Glarus, where he remained for ten years, after which he was pastor for three years at Einsiedeln. His study of the New Testament led him, quite independently of Luther, to advocate reforms within the Church, without thought at first of separation. With him, also, the sale of indulgences formed the starting point, and he preached against them with such effect that the commissioner was obliged to leave Switzerland. In 1519 he became pastor of the Grossmünster Church in the important city of Zürich, where he began to advocate other definite reforms, such as the right of priests to marry and the reduction of tithes. He finally broke with the Church and proposed a return to the simple Christianity of the New Testament, with the abolishment of all doctrines and practices not contained therein. His views spread throughout Switzerland and found general acceptance except among the Forest Cantons.

The similarity of the German and Swiss movements became evident, and in 1529 Zwingli met Luther and other German Reformers at Marburg, in an attempt to unite forces. This failed, however, because of differences concerning the Lord's Supper and because of Luther's objection to the alliance of the Swiss reform movement with the civil authorities. Zwingli was an ardent patriot and worked zealously for the preservation of the Swiss Confederation. When this was threatened by the contest between the Catholic and Protestant cantons he accompanied the Zürich regiment as fighting chaplain, and was killed at the Battle of Kappel in 1531. See REFORMATION, THE; LUTHER, MARTIN

SUGGESTED COURSES OF READING

TOPICAL INDEX

Systematic study is the secret of rapid advancement in self-culture. Most intelligent people have felt a desire to pursue a definite plan of reading under authoritative supervision. We have devised a means to gratify this desire by classifying all related subjects in a Topical Index. Thus the value of THE HOME AND SCHOOL REFERENCE WORK is greatly enhanced. The Index divides each department of knowledge into its larger subdivisions, and places under these the subdivisions and topics belonging to each. A brief introductory note precedes each department and most of the larger subdivisions. These notes will be found of great assistance to the reader.

AGRICULTURE

Agriculture, Horticulture and Forestry are closely related. They deal with the cultivation of plants and animals for the purpose of satisfying human needs. Agriculture deals with general farming, including the equipment and management of the farm, and the raising of crops and live stock. The raising of crops involves the selection and preparation of the soil, the selection and planting of the seed, the cultivation and care of the growing plant, and the harvesting and marketing of the crop. The raising of live stock includes the selection and breeding of cattle, their food and care, and the sale of products. For general article, see:

Agriculture

See also Index, Department of Horticulture and Forestry.

I. Plant Culture

1. SOIL AND TILLAGE

The primary requisite in successful farming is the selection of soil adapted to the raising of the desired crop. The soil must then be properly fertilized, irrigated and tilled. See:

Clay
Drainage
Dry-Farming
Ensilage

Fertilizer
Guano
Gypsum
Irrigation
Limestone
Manure
Nitrogen
Phosphorus
Potash
Ranching
Rotation of Crops
Silica
Soil
Weather Bureau

2. AGRICULTURAL EQUIPMENT

The cultivation of the soil has been revolutionized during the last half century by the introduction of improved farm machinery, until the complete equipment of the farm has become an elaborate matter. See:

Auto Truck (See Automobile)
Binding Twine
Chaff Cutter
Chain
Corn Harvester
Corn Husker and Shredder
Corn Planter
Gas Engine
Grain Drill
Grain Elevator
Harness
Harrow
Manure Spreader

Mowing Machine
Nails
Plow
Rake
Reaping Machine
Saddle
Saw
Scythe
Seeder
Silo
Stacker
Tedder
Thrashing Machine
Traction Engine

3. PLANT DISEASES

There are certain diseases that attack the growing crops, and it is important that the nature of these be understood, and that they be guarded against and destroyed. See:

Blight
Dry Rot
Ergot
Fungus
Mildew
Mold
Rot
Rust
Smut
Spraying
Spraying Mixture

4. CROPS

The list of crops here given does not include garden vegetables, which are generally regarded as belonging to the Department of Horticulture. For these and for fruits, see headings Horticulture and Forestry below. See:

Alfalfa
Bamboo
Barley
Bean
Beet
Bermuda Grass
Blue Grass
Broom Corn
Buckwheat
Buffalo Grass
Corn
Cotton

Couch Grass
Esparto
Flax
Flaxseed
Foxtail Grass
Grass
Hay
Hemp
Kafir Corn
Millet
Oats
Pea
Potato
Rice
Rye
Squirreltail Grass
Sugar Cane
Sweet Potato
Timothy
Tobacco
Wheat

5. CROP PRODUCTS

After the farmer has raised and harvested his grains, they are converted into various articles of food and drink. These are not usually produced on the farm, or considered a part of farming, but it is worth while to call attention to them here. See:

Beet Sugar (See Sugar)
Corn Meal (See Corn)
Distilled Liquors
Flour
Food
Glucose Sirup
Sago
Sugar

II. Live Stock and Dairying

The second main division of Agriculture is the raising and marketing of animals.

1. FARM ANIMALS AND THEIR DISEASES

See:

Ass
Foot and Mouth Disease
Foot Rot
Gapes
Goat
Hog

Horse
Lumpy Jaw
Mange
Pony
Rinderpest
Sheep
Spavin
Veterinary Medicine

2. DAIRYING

One of the most important branches of live-stock culture is dairying, which cares for the milk and cream and converts them into butter and cheese. See:

Dairy Husbandry
Butter
Cattle
Cheese
Churn
Creamery
Cream Separator
Milk
Milk Tester

3. STOCK PRODUCTS

The following are some of the important stock products. See:

Beef
Leather
Meat Packing
Mutton
Pork
Sausage
Wool, Manufacture of

III. Poultry and Bees

The raising of poultry is carried on incidentally in connection with almost every farm, and certain establishments devote themselves exclusively to this industry. The aggregate output is very large, the value of the annual egg crop in the United States exceeding that of the wheat crop. See:

Poultry
Bee
Canada Goose
Duck
Eggs
Fowl, Domestic

Guinea Fowl
Honey
Incubator
Pigeon
Squab
Turkey

IV. Agricultural Education

Great progress has been made in agricultural education during recent years, by means of elementary study in the common schools, advanced courses in the agricultural colleges, short courses, institutes, periodicals and lectures. See:

Agricultural College
Agricultural Experiment Stations
Agricultural Extension Work
Agricultural High School
Agricultural Journals
Agriculture
Agriculture, Department of
Agriculture in Common Schools
Boys and Girls Clubs
Farmers' Clubs
Farmers' Institutes
School Garden

V. Books

For further reading the following books will be found helpful:

Carver, *Rural Economics*; Smith, *Farm Mechanics*; Warren, *Farm Management*; Montgomery, *Productive Farm Crops*; Sears, *Productive Orchardring*; Lloyd, *Productive Vegetable Growing*; Plumb, *Types and Breeds of Farm Animals*; Henry and Morrison, *Feeds and Feeding*; Mumford, *Beef Production*; Eckles, *Dairy Cattle*; Coffey, *Productive Sheep Husbandry*; Smith, *Pork Production*; Gay, *Productive Horse Husbandry*; Smith, *Principles of Live Stock Judging*; Lewis, *Productive Poultry Husbandry*; Craig, *Common Diseases of Farm Animals*.

ANTHROPOLOGY AND ETHNOLOGY

In its broadest sense, Anthropology is the science of man, and embraces all the branches of knowledge that deal with

man and his life on the earth. Specifically, however, since this field is covered by various particular sciences, Anthropology and its kindred science of Ethnology are largely confined to the study of man as a zoological genus and to the origins of human culture in the world, as gathered from ancient remains and the customs of surviving savage peoples. They are the sciences of primitive human life.

For general articles, see:

Anthropology
Ethnography
Ethnology
Man

I. Prehistoric Remains

The primitive peoples left traces or monuments of various kinds which have been found in both hemispheres. From the study of these remains a fairly good idea is gained of the early inhabitants of the earth. See:

Cave Dwellers
Cliff Dwellers
Lake Dwellings
Mound Builders
Pottery
Stone Age
Totem

II. Other Monuments

In addition to the prehistoric remains there are other sources of knowledge that throw light on ancient times. See: Ancestor Worship

Arrow
Blowpipe
Boomerang
Burial
Coffin
Cuneiform Inscriptions
Fairy
Festivals
Folk Lore
Ghost
Hieroglyphics
Language
Law
Marriage
Mummy
Music

Religion
Sacrifice
Sarcophagus
Slavery
Tattooing
Tomahawk
Totem
Tribe
Wampum
Witchcraft
Writing

III. General Divisions of Mankind

The division of the human race into general groups is made in different ways by different ethnologists. The classification here given is the one that has been most common, although it is not universally accepted today.

1. AMERICANS

See:

Indians, American
Algonquian
Apache
Arapahoe
Assiniboin
Athapaskan
Aztec
Blackfoot
Cherokee
Cheyenne
Chickasaw
Choctaw
Comanche
Cree
Creek Indians
Crow
Eskimo
Five Civilized Tribes
Five Nations
Flathead
Fox
Geronimo
Illinois
Inca
Iroquois
Kickapoo
Mandan
Modoc
Mohave
Mohawk

Mohican
Moki
Navaho
Neutral Nation
Nez Perce
Ojibway
Omaha
Oneida
Onondaga
Ottawa
Pawnee
Pottawattomie
Pueblo
Sac
Seminole
Seneca
Shawnee
Shoshoni
Sioux
Toltec
Tuscarora
Ute
Wampanoag
Wyandot

2. CAUCASIANS

See:

Anglo-Saxon
Arabs
Aryan
Bedouins
Celts
Circassians
Copts
Cossacks
Franks
Gael
Goths
Gypsy
Hamites
Hottentots
Huns
Lombards
Normans
Picts
Saxons
Semites
Slovak
Slovenians
Teutonic Race
Vandals

3. MONGOLIANS

See:

Aino

Dyaks
Eskimo
Huns
Kalmucks
Maoris
Mongols
Saracens
Tartars

4. NEGROES

See:

Kafir
Negro
Pygmies

IV. Biographies

The following are some of the well-known anthropologists and ethnologists:

Brinton, D. G.
Catlin, George
Lubbock, Sir John
Powell, J. W.
Schoolcraft, H. R.

V. Books

For further reading on the subject of anthropology and ethnology the following works will be found helpful:

Tylor, *Introduction to the Study of Man and Civilization*, and *Anthropology*; Abbott, *Primitive Industry*; Baldwin, *Ancient America*; Dellenbaugh, *The North Americans of Yesterday*; Keane, *Ethnology*; Brinton, *Races and Peoples*, and *The American Race*; and the writings of Schoolcraft and Catlin on the North American Indians.

ARMY AND NAVY

Up to the present time war has been the final appeal of nations in the settlement of their controversies. The time may come when such settlement will be made by an international court, in which case the army and navy will perform only police duties. In any case the efficient organization of these branches of the government is a matter of great importance.

I. War

There are certain topics pertaining to war in general, and common to both

army and navy, that may well be considered first.

1. GENERAL

See:

War
Armistice
Beacon
Bounty
Champion
Courts-Martial
Draft
Flag of Truce
Furlough
Hospital, Military
Military Academy, United States
Mutiny
Peace Conference, International
Pension
Siege
Signal Corps
Signaling
Soldiers' Homes
Spy
Tactics, Military

2. ORDNANCE AND GUNNERY

See:

Archery
Arsenal
Artillery
Battering-Ram
Bayonet
Blowgun
Blunderbuss
Boomerang
Bullets
Cannon
Cartridge
Catapult
Dumdum
Flintlock
Gatling Gun
Grapeshot
Halberd
Howitzer
Javelin
Lance
Machine Gun
Magazine
Musket
Rapier
Revolver

Rifle
Shell
Shot
Sling
Small Arms
Sword
Tomahawk
Torpedo

3. FORTIFICATIONS

For topics relating to fortifications, see:

Blockhouse
Breastwork
Castle
Gabion
Moat

II. The Army

Most nations keep a standing army, and this is reinforced in cases of actual war by the militia and by volunteers. The standing army of the United States is a little over 60,000. For general articles, see:

Army
Army, United States

1. ORGANIZATION AND OFFICERS

The effectiveness of an army depends largely upon its organization and officers. See:

Rank
Captain
Cavalry
Colonel
Cossacks
Field Marshal
Free Lances
Infantry
Legion of Honor
Lieutenant
Major
Militia
Phalanx
Sergeant
War, Department of

For divisions of the army, such as Company, Brigade, Regiment, see:
Army, United States

2. EQUIPMENT

The equipment of the army is also very important. A part of the equipment is described in articles listed under subhead Ordnance and Gunnery, in this article. For other items of accoutrement, see:

Armor
Hauberk
Haversack
Helmet
Knapsack
Shield
Uniform

III. The Navy

The navy is the army of the sea, and exerts great influence in warfare.

For general articles, see:

Navy
Blockade
Navigation
Ship

1. OFFICERS

For articles on naval officers, see:

Rank
Admiral
Boatswain
Captain
Commander
Commodore
Ensign
Lieutenant
Navy, Department of the
Rear-Admiral

2. NAVAL VESSELS

For the different kinds of naval vessels, see:

Armored Cruiser
Frigate
Gunboat
Hospital Ship
Monitor, The
Submarine
Supply Ship
Torpedo Boat Destroyer
Training Ship
Warship

3. MISCELLANEOUS

For articles on naval construction, education, etc., see:

Armor Plate
Constitution, The
Marines
Naval Academy, United States
Naval Reserve
Naval Schools of Instruction
Navy Yard
Signaling

IV. Books

For further information concerning armies and navies, see:

Oman, *Art of War in The Middle Ages*; Jerram, *Armies of the World*; the *Reports of the Military Division* of the War Department; the annual issue of the *Statesman's Year Book*; Cooper, *History of the Navy*; files of the *Army and Navy Journal*; the *Navy Register*; Mahan, *Influence of Sea Power on History*.

ART

In the art of a nation we see the expression of one of the highest and noblest of man's emotions, the love of the beautiful; and in these lasting monuments made by the hand of man the true character of the nation is handed down to posterity. In art we include sculpture, painting and architecture.

For general articles, see:

Architecture
Fine Arts
Louvre, Palace of the
Oriental Art
Painting
Paintings, The Twelve Great
Sculpture

I. Painting

From the earliest time men have tried to express their idea of religious subjects on canvas, so that many of our greatest masterpieces have originally adorned cathedrals; some have been removed to art galleries, while others still remain in their place. Nature and life have inspired many of the artists in

the later centuries. Much will be found in the artists' biographies. See also:

Madonna
Painting
Paintings, The Twelve Great

II. Sculpture

The numerous stages through which sculpture has passed have brought forth wonderful and enduring works of art. From the early Greek classic art which culminated in Phidias, through the realistic stage down to the modern return to classic style, we find a masterful list of sculptors whose work has inspiration, strength and perfection grouped together. In the biographies of these men much can be found on their work. See also:

Sculpture
Apollo
Athens, subhead *Age of Pericles*
Elgin Marbles
Laocoön

III. Architecture

The buildings which have stood the test of ages are the admiration of the world and show the stable characters of their builders. See:

Architecture
Abydos
Acropolis (See Athens, subhead *Age of Pericles*)
Colosseum
Karnak, The Temple of
Luxor, The Temple of
Pantheon, The (See Rome, Ancient)
Parthenon, The (See Athens, subhead *Age of Pericles*)
Pyramids
Saint Mark, Cathedral of
Saint Sophia, Mosque of
Temple, The
Taj, Mahal
Westminster Abbey

IV. Biographies

1. PAINTERS

Fourteenth and Fifteenth Centuries

Angelico, Fra
Bellini, Giovanni

Bellini, Jacopo
Botticelli, Sandro
Correggio
Dürer, Albrecht
Eyck, van, Hubert and Jan
Ghiberti, Lorenzo
Giorgione da Castelfranco
Giotto di Bondone
Lippi, Fra Filippo
Mantegna, Andrea
Masaccio
Memling, Hans
Michelangelo, Buonarroti
Orcagna, Andrea
Perugino, Pietro
Raphael, Sanzio
Sarto, Andrea del
Signorelli, Luca
Vinci, Leonardo da

Sixteenth Century

Caracci
Rubens, P. P.
Tintoretto, Il
Titian
Veronese, Paul

Seventeenth Century

Claude Lorrain
Giordano, Luca
Hals, Frans
Hobbema, Meindert
Lebrun, Charles
Murillo, B. E.
Poussin, Nicolas
Rembrandt
Ruysdael, Jacob
Teniers, David
Van Dyck, Sir Anthony
Velásquez, D. R.

Eighteenth Century

Allston, Washington
Constable, John
Copley, J. S.
Gainsborough, Sir Thomas
Hogarth, William
Lebrun, Marie L. E. V.
Reynolds, Sir Joshua
Trumbull, John
West, Benjamin

ART

Nineteenth Century

Abbey, E. A.
Alma-Tadema, Sir Laurence
Blashfield, E. H.
Bonheur, Rosa
Breton, J. A.
Brush, G. D.
Burne-Jones, Sir Edward
Chase, W. M.
Corot, J. B. C.
Cornelius, Peter von
Crane, Walter
Daubigny, C. F.
Doré, P. G.
Herkomer, Sir Hubert von
Homer, Winslow
Hunt, W. H.
Inness, George
Israëls, Josef
Kaulbach, Wilhelm von
La Farge, John
Landseer, Sir E. H.
Leighton, Sir Frederick
Martin, H. D.
Millais, Sir J. E.
Millet, F. D.
Millet, J. F.
Page, William
Remington, Frederic
Rossetti, D. G.
Sargent, J. S.
Sorolla y Bastida, J.
Turner, J. M. W.
Vedder, Elihu
Watts, G. F.
Whistler, J. A. M.

2. SCULPTORS

Fourth Century, B. C.

Lysippus
Praxiteles

Sixth Century, B. C.

Phidias

Fourteenth Century

Ghiberti, Lorenzo
Orcagna, Andrea

Fifteenth Century

Donatello
Robbia, Della

INDEX

Verrocchio, Andrea del
Vinci, Leonardo da

Sixteenth Century

Cellini, Benvenuto
Michelangelo Buonarroti

Nineteenth Century

Brown, H. K.
Foley, J. H.
French, D. C.
MacMonnies, F. W.
Mead, L. G.
Niehaus, C. H.
Partridge, W. O.
Rauch, C. D.
Rodin, Auguste
Saint Gaudens, Augustus
Story, W. W.
Taft, Lorado
Ward, J. Q. A.

V. Books

For supplemental reading, the following books will be found helpful:

Reinach, *Apollo*; Caffin, *American Masters of Painting*; Marquand and Frothingham, *A History of Sculpture*; Hamlin, *A History of Architecture*; De Forest, *A Short History of Art*; Van Dyke, *How to Judge a Picture*.

ASTRONOMY

Astronomy is the science that treats of the heavenly bodies. It is one of the oldest of the sciences, but has made great advances in modern times through the use of new methods of research and improved instruments of observation. Astronomy is usually divided into descriptive, practical, theoretical and historical. In this outline, however, another kind of division will be more profitable.

For general articles, see:

Astrology
Astronomy
Evolution
Universe

I. General Topics

There are many subjects of a general nature connected with astronomy. See:

Altitude
Apsides
Astrophotography
Azimuth
Celestial Sphere
Copernican System
Declination
Dog Days
Ecliptic
Equinoctial
Equinox
Gravitation
Meridian
Nebular Hypothesis
Orbit
Parallax
Poles of the Heavens
Ptolemaic System
Right Ascension
Solstice
Zodiac
Zodiacal Light

II. Astronomical Instruments

For some of the important instruments used in astronomical observations, see:

Chronometer
Lens
Lick Observatory
Mural Circle
Observatory
Quadrant
Sextant
Spectroscope
Telescope
Transit
Yerkes Observatory

III. The Solar System

The solar system is that part of the stellar universe which centers about the sun (Latin, *sol*). It includes the sun, the planets with their satellites, the comets and meteors. See:

Solar System
Comet
Earth
Earthshine

Eclipse
Harvest Moon
Jupiter
Mars
Mercury
Meteor
Moon
Nebulæ
Neptune
Planet
Planetoid
Precession of Equinoxes
Satellite
Saturn
Seasons
Sun
Tides
Uranus
Venus

IV. Stars

In size and nature the stars are similar to our sun, many of them being even larger and brighter. A knowledge of the stars and constellations may be made a source of genuine pleasure. See:

Stars
Aldebaran
Algol
Aquarius
Arcturus
Aries
Bootes
Cancer, The Crab
Canes, Major
Capricornus, The Goat
Cassiopeia
Constellations
Double and Multiple Stars
Gemini
Great Bear
Leo, The Lion
Libra, The Balance
Milky Way
Orion
Pisces, The Fishes
Pleiades
Sagittarius, The Archer
Scorpio
Sirius
Southern Cross
Taurus, The Bull
Virgo

INDEX

V. Divisions of Time

The divisions of time belong to the department of astronomy, since they are mainly derived from the motions of the earth, sun and moon. See:

Almanac
Calendar
April
August
Autumn
Day
December
Dominical Letter
February
Friday
January
July
June
Leap Year
March
May
Monday
Month
New Year's Day
November
October
Saturday
September
Sidereal Time
Spring
Summer
Sunday
Thursday
Tuesday
Wednesday
Week
Winter
Year

VI. Biographies

The following are some of the eminent astronomers and astronomical writers:

Brahe, Tycho
Copernicus, Nicholas
Galileo
Halley, Edmund
Herschel, C. L.
Herschel, Sir J. F. W.
Herschel, Sir William
Kepler, Johann
Laplace, P. S.

Mitchell, Maria
Newcomb, Simon
Newton, Sir Isaac
Proctor, R. A.
Ptolemy, C. P.
Young, C. A.

VII Books

For further reading on the subject of astronomy the following works will be found helpful:

Chambers, *Astronomy* (in 3 vols.); Newcomb, *The Stars*, and *Astronomy for Everybody*; Ball, *Story of the Heavens*, *Atlas of Astronomy*, and *Popular Guide to the Heavens*; Flammarion, *Popular Astronomy*; Young, *Text-book of General Astronomy*; Lowell, *The Solar System*; Clarke, *The System of the Stars*, and *Popular History of Astronomy in the 19th Century*; Berry, *Short History of Astronomy*.

ATHLETICS AND PASTIMES

Some one has said that the character of a nation is determined by its play. If this is true, then as wealth and leisure increase the subject of recreation in its various forms becomes increasingly important. The purpose of athletics, sports and games is either physical development, re-creation of nervous energy, or pleasurable diversion.

For general articles, see:

Gymnastics
Physical Culture

I. Nature Pastimes

"Back to nature" is a watchword of the day. By summer outings, fresh-air funds, public parks, outdoor living and sports, an attempt is made to offset the confinement of city life and the nervous wear of modern civilization. See:

Archery
Boy Scouts of America
Riding
Tobogganing
Tournament

II. Water and Ice Sports

Sports on the water and ice are exhilarating and popular outdoor pastimes. See:

Curling
Hockey
Ice Yachting
Rowing
Skating
Skiing
Swimming
Water Polo
Yachting

III. Ball Games

Many games are played with the ball in various ways. These, likewise, are for the most part played out of doors. See:

Bagatelle
Baseball
Basket Ball
Billiards
Bowling
Cricket
Croquet
Football
Golf
Hand Ball
Hockey
Indoor Baseball
Lacrosse
Lawn Tennis
Ping Pong
Polo
Pool
Water Polo

IV. Intellectual Games

While intellectual activity is necessary in most sports and games, the following are primarily intellectual:

Checkers
Chess

V. Games of Chance

Games of chance are alike in that they are contingent upon such elements of chance as are involved in the dealing of cards, the shaking of dice or the movements of a wheel. Many of these games, however, require the exercise of intel-

lectual ability and skill in the progress of the play. See:

Backgammon
Cards, Playing
Cribbage
Dice
Dominoes
Draw Poker
Ecarté
Euchre
Piquet
Whist

VI. Other Sports and Pastimes

For other sports and games, see:

Boxing
Bullfighting
Circus
Dancing
Falconry
Fencing
Firecrackers
Fireworks
Halloween
Isthmian Games
Jackstraws
Jester
Jiu-jitsu
Magician
Marbles
Olympian Games
Pantomime
Quoits
Saturnalia
Shuffleboard
Stadium
Stilts
Wrestling

VII. Books

For further reading the following books may be consulted:

Anderson, *The Making of a Perfect Man*; James, *Practical Training*; Dowd-wig, *Games in Preparatory Schools*; Stonehange, *Rural Sports*; Cassell, *Sports and Pastimes*; Bigelow, etc., *One Hundred and Fifty Gymnastic Games*; Lee, *Playground Education*, in the *Educational Review* for December, 1901; Plummer, *Athletics and Games of the Ancient Greeks*, in *American Physical Education Review*, 1898; *Encyclo-*

pedia of Sports; various manuals of games; publications of the National Playground Association.

BIOGRAPHY

Biography is history in the making. Man is the arbiter of fate, the creator of history. While it is true that the times in which a man lives react upon him and form certain general limitations of his life, yet it is also true that the course of history is to a large extent shaped by men of epochal importance who contributed some new and original element to the world's progress.

There is no better or more interesting way for young people to begin the study of history than by reading the inspiring lives of its makers. We recognize in them kindred spirits who beckon us on to contribute our own honest share to the world's work. In the following outline, most of the great characters of the world have been collected together under appropriate headings. **THE SOURCE** Book will be found by the reader especially strong in its Department of Biography.

I. Actors

The dramatic representation of life serves two purposes: It gives an opportunity for the portrayal of motives and the operation of the moral law more clearly than they are to be seen amid the complexity of life; and it provides mental relaxation and entertainment. For great actors and actresses, see:

Adams, Maude K.
Bernhardt, Sarah
Booth, Edwin T.
Campbell, Beatrice
Coquelin, B. C.
Drew, John
Fiske, Minnie M.
Forrest, Edwin
Garrick, David
Goodwin, N. C.
Irving, Sir Henry
Jefferson, Joseph
Kean, Edmund
Mansfield, Richard

Marlowe, Julia
Payne, J. H.
Sothorn, E. H.
Terry, Ellen A.

II. Artists and Musicians

Art is primarily the expression of the beauty and harmony of the world and of life. It takes the form of painting, sculpture, architecture and music. For the great artists in these fields of endeavor, see:

Abbey, E. A.
Allston, Washington
Alma-Tadema, Sir Laurence
Angelico, Fra
Bach, J. S.
Beethoven, Ludwig Van
Bellini, Giovanni
Bellini, Jacopo
Berlioz, Hector
Bizet, A. C. L.
Blashfield, E. H.
Bonheur, Rosa
Botticelli, Sandro
Brahms, Johannes
Breton, J. A.
Brown, H. K.
Brush, G. D.
Buck, Dudley
Bull, O. B.
Burne-Jones, Sir Edward
Burnham, D. H.
Caracci
Caruso, Enrico
Cecilia, Saint
Cellini, Benvenuto
Chadwick, G. W.
Chaminade, Cecile
Chase, W. M.
Chopin, F. F.
Claude Lorrain
Constable, John
Copley, J. S.
Cornelius, Peter von
Corot, J. B. C.
Correggio
Crane, Walter
Damrosch, W. J.
Daubigny, C. F.
De Koven, Reginald
Donatello

Doré, P. G.
 Dürer, Albrecht
 Eyck, van, Hubert and Jan
 Foley, J. H.
 French, D. C.
 Gainsborough, Sir Thomas
 Ghiberti, Lorenzo
 Giordano, Luca
 Giorgione da Castelfranco
 Giotto di Bondone
 Gluck, C. W.
 Gounod, C. F.
 Grieg, E. H.
 Hals, Frans
 Handel, G. F.
 Haydn, F. J.
 Herkomer, Sir Hubert von
 Hobbema, Meindert
 Hogarth, William
 Homer, Winslow
 Hunt, W. H.
 Inness, George
 Israëls, Josef
 Kaulbach, Wilhelm von
 La Farge, John
 Landseer, Sir E. H.
 Lebrun, Charles
 Lebrun, Marie L. E. V.
 Leighton, Sir Frederick
 Lind, Jenny
 Lippi, Fra Filippo
 Liszt, Franz
 Lysippus
 MacMonnies, F. W.
 Mantegna, Andrea
 Martin, H. D.
 Masaccio
 Mead, L. G.
 Melba
 Memling, Hans
 Mendelssohn-Bartholdy
 Michelangelo Buonarroti
 Millais, Sir J. E.
 Millet, F. D.
 Millet, J. F.
 Mozart, W. A.
 Murillo, B. E.
 Niehaus, C. H.
 Nordica, Lillian
 Orcagna, Andrea
 Paganini, Nicolò
 Page, William

Partridge, W. O.
 Patti, Adelina J. M.
 Perugino, Pietro
 Phidias
 Poussin, Nicolas
 Praxiteles
 Raphael Sanzio
 Rauch, C. D.
 Rembrandt
 Remington, Frederic
 Reynolds, Sir Joshua
 Robbia, Della
 Rodin, Auguste
 Rossetti, D. G.
 Rossini, G. A.
 Rubens, P. P.
 Rubinstein, A. G.
 Ruysdael, Jacob
 Saint Gaudens, Augustus
 Saint-Saëns, C. C.
 Sargent, J. S.
 Sarto, Andrea del
 Schubert, F. P.
 Schumann, R. A.
 Schumann-Heink, Ernestine
 Sembrich, Marcella
 Signorelli, Luca
 Sorolla y Bastida
 Story, W. W.
 Stradivari, Antonio
 Strauss, Richard
 Taft, Lorado
 Teniers, David
 Thomas, Theodore
 Tintoretto, Il
 Titian
 Trumbull, John
 Turner, J. M. W.
 Van Dyck, Sir Anthony
 Vedder, Elihu
 Velásquez, D. R.
 Verdi, Giuseppe
 Veronese, Paul
 Verrocchio, Andrea del
 Vinci, Leonardo da
 Wagner, Richard
 Ward, J. Q. A.
 Watts, G. F.
 Weber, K. M. F.
 West, Benjamin
 Whistler, J. A. M.
 Zeisler, Fanny B.

III. Bible Characters

Many men and women who have exercised great influence upon the world's history are mentioned in the Bible. These will be found in their alphabetical order in the work. A list of them here is not necessary.

IV. Economic, Industrial and Social Writers and Workers

Economic and social subjects are of universal interest today, when the conditions of associative life are being studied scientifically and unusual efforts are being made toward social betterment. The following writers treat various phases of the subject:

Addams, Jane
Atkinson, Edward
Blanc, J. J. L.
Comte, I. A.
Debs, E. V.
Ely, R. T.
Fourier, F. M. C.
George, Henry
Giddings, F. H.
Gompers, Samuel
Henderson, C. R.
Jevons, W. S.
Lathrop, Julia C.
Laughlin, J. L.
Malthus, T. R.
Marx, Karl
Mill, J. S.
Mitchell, John
Owen, Robert
Powderly, T. V.
Proudhon, P. J.
Ricardo, David
Saint-Simon, C. H.
Small, A. W.
Smith, Adam
Taylor, Graham
Walker, F. A.
Ward, L. F.
Wright, C. D.

V. Educators

Education has as its object the development of well-rounded and efficient men and women, and the passing on of the culture of civilization from genera-

tion to generation. For noted educators, see:

Adler, Felix
Andrews, E. B.
Angell, J. B.
Arnold, Thomas
Baldwin, J. M.
Barnard, F. A. P.
Barnard, Henry
Brinton, D. G.
Brown, E. E.
Butler, N. M.
Comenius, J. A.
Dewey, John
Dewey, Melvil
Draper, A. S.
Du Bois, Wm. E. B.
Fénelon, Francois
Fiske, John
Francke, A. H.
Froebel, F. W. A.
Gilman, D. C.
Greenwood, J. M.
Gunsaulus, F. W.
Hadley, A. T.
Hall, G. S.
Harper, W. R.
Harris, W. T.
Herbart, J. F.
Hibben, J. G.
Hill, D. J.
Hughes, J. L.
James, E. J.
James, William
Jordan, D. S.
Judson, H. P.
Ladd, G. T.
Low, Seth
Lowell, A. L.
Lyons, Mary M.
McCosh, James
Mann, Horace
Northrop, Cyrus
Palmer, Alice F.
Parker, F. W.
Pestalozzi, J. H.
Porter, Noah
Pritchett, H. S.
Quintilian
Rawlinson, Sir H. C.
Remsen, Ira
Sabin, Henry
Schurman, J. G.

Smith, Goldwin
 Sparks, Jared
 Sturm, Johann
 Sully, James
 Tyler, M. C.
 Van Hise, C. R.
 Vincent, G. E.
 Washington, B. T.
 Webster, Noah
 Wheeler, B. I.
 White, A. D.
 Whitney, W. D.
 Willard, Emma H.
 Wilson, Woodrow
 Young, Ella F.

VI. Explorers and Travelers

There are no more thrilling chapters in history than those that tell of the men who discovered and explored new lands and became the pioneers of progress. See:

Abruzzi, Prince
 Americus Vesputius
 Amundsen, Roald
 Balboa, Vasco
 Baltimore, Sir G. C.
 Bienville, J. B.
 Boone, Daniel
 Cabot, John
 Cabot, Sebastian
 Cartier, Jacques
 Champlain, Samuel de
 Columbus, Christopher
 Cook, James
 Cortez, Hernando
 De Soto, Fernando
 Dias, Bartholomeu
 Drake, Sir Francis
 Du Chaillu, P. B.
 Eric the Red
 Franklin, Sir John
 Fremont, J. C.
 Frisbisher, Sir Martin
 Frontenac, Louis
 Galva, Vasco da
 Hennepin, Louis
 Hudson, Henry
 Iberville, Pierre
 La Salle, R. R. C.
 Leif Ericson
 Livingstone, David

Marquette, Jacques
 Nansen, Fridtjof
 Park, Mungo
 Peary, R. E.
 Penn, William
 Pizarro, Francisco
 Polo, Marco
 Ponce de Leon, Juan
 Scott, R. F.
 Smith, John
 Stanley, Sir H. M.
 Tonty, Henry de

VII. Financiers and Captains of Industry

Wealth is the physical basis of life and of civilization. The creators of wealth, therefore, are among the world's great benefactors. For noted financiers and captains of industry, see:

Armour, P. D.
 Astor, J. J.
 Barnum, P. T.
 Belmont, August
 Carnegie, Andrew
 Cassatt, A. J.
 Cooke, Jay
 Cooper, Peter
 Cunard, Sir Samuel
 Field, C. W.
 Field, Marshall
 Gallatin, Albert
 Gould, Jay
 Harriman, E. H.
 Hill, J. J.
 MacVeagh, Franklin
 Morgan, J. P.
 Morris, Robert
 Necker, Jacques
 Rockefeller, J. D.
 Rothschild
 Sage, Russell
 Sherman, John
 Stanford, Leland
 Vanderbilt, Cornelius
 Wanamaker, John

VIII. Inventors

The age of science has become the age of invention also, when the new facts learned about nature have been put under tribute to minister to human life.

The men who have thus harnessed the forces of nature to the world's burdens are well worthy of our consideration.
See:

Arkwright, Sir Richard
Armstrong, Sir W. G.
Bell, A. G.
Bessemer, Sir Henry
Cartwright, Edmund
Edison, T. A.
Ericsson, John
Fulton, Robert
Gatling, R. J.
Gray, Elisha
Gutenberg, Johannes
Hoe, R. M.
Howe, Elias
Krupp, Alfred
McCormick, C. H.
Marconi, Guglielmo
Maxim, H. S.
Morse, S. F. B.
Pitman, Sir Isaac
Pullman, G. M.
Stephenson, George
Tesla, Nikola
Watt, James
Westinghouse, George
Whitney, Eli
Wright, Orville and Wilbur

IX. Jurists

In every highly organized society the laws which regulate life form an important element. For some of the world's great jurists, see:

Brewer, D. J.
Chase, S. P.
Cooley, T. M.
Day, W. R.
Dorion, Sir A. A.
Draco
Erskine, Thomas
Field, S. J.
Fuller, M. W.
Harlan, J. M.
Holmes, O. W., Jr.
Hughes, C. E.
Justinian
Lindsey, B. B.
Lycurgus
Marshall, John

Solon
Story, Joseph
Waite, M. R.
White, E. D.

X. Kings and Rulers

In days past, and to a lesser extent today also, kings and rulers have played an influential part in history. They are leaders in the political life of their respective nations. For some of the world's important rulers, see:

Alexander the Great
Alfonso XIII
Alfred the Great
Anne
Artaxerxes
Attila
Augustus
Aurelius, Marcus
Bruce, Robert
Cæsar, C. J.
Canute
Catherine II
Charlemagne
Charles I (England)
Charles II (England)
Charles V (Germany)
Charles XII
Charles Martel
Christina
Cleopatra
Constantine the Great
Cræsus
Cromwell, Oliver
Cyrus the Great
Darius Hystaspes
Diocletian
Edward I
Edward III
Edward VII
Elizabeth
Emin Pasha
Esarhaddon
Ferdinand V of Castile
Francis I (France)
Francis II (Holy Roman Empire)
Francis Joseph[†]
Frederick II
George I
George V
Gustavus I

Gustavus Adolphus
 Hadrian
 Henry IV (France)
 Henry IV (Holy Roman Empire)
 Henry VIII
 Herod
 James I
 James II
 Justinian
 Leopold II
 Louis
 Louis XIV
 Louis XV
 Louis XVI
 Louis Philippe
 Maccabees
 Margaret
 Margaret of Anjou
 Maria Theresa
 Mary Stuart
 Maximilian
 Medici
 Medici, Lorenzo de'
 Mutsuhito
 Napoleon I
 Napoleon III
 Nebuchadnezzar
 Nero
 Nicholas I
 Nicholas II
 Peter I
 Peter the Great
 Philip II (Macedon)
 Philip II (Spain)
 Rameses II
 Richard I
 Richard II
 Richard III
 Romulus
 Saladin
 Sargon II
 Sennacherib
 Solyman II
 Theodoric
 Theodosius
 Tiberius
 Titus
 Trajan
 Vespasian
 Victor Emmanuel II
 Victor Emmanuel III
 Victoria
 Wilhelmina, Queen

William I (England)
 William I (Germany)
 William II
 William III
 William of Orange
 Xerxes

XI. Philanthropists and Reformers

Certain earnest men and women have given their direct thought and efforts toward the relief of suffering and the improvement of the conditions of society. See:

Anthony, Susan B.
 Barton, Clara
 Booth, Maud
 Booth, William
 Brown, John
 Carnegie, Andrew
 Cooper, Peter
 Damien, Father
 Darling, Grace
 Grenfell, W. T.
 Howard, John
 Livermore, Mary A. R.
 Luther, Martin
 Nightingale, Florence
 Oglethorpe, J. D.
 Peabody, George
 Penn, William
 Stanford, Leland
 Stanton, Elizabeth C.
 Tyndale, William
 Wilberforce, William
 Willard, Frances E.
 Yale, Elihu

XII. Philosophers

The men whose systems form the stream of systematic thinking are the world's philosophers. They will be found listed in the Index, Department of Philosophy and Psychology. See also subhead Educators, above.

XIII. Poets, Novelists, Historians and Other Writers

There are men and women whose writings constitute the world's literature. These will be found listed in the Index, Department of Language and Literature.

XIV. Scientists

There is no more characteristic feature of modern life than what we call science, which is a systematic and painstaking endeavor to ascertain the facts of nature and of life and the laws that underly them. For the great scientists, see:

Achard, F. K.
 Agassiz, Alexander
 Agassiz, L. J. R.
 Arago, D. F.
 Archimedes
 Audubon, J. J.
 Bacon, Francis
 Bacon, Roger
 Brahe, Tycho
 Bunsen, R. W.
 Burbank, Luther
 Cavendish, Henry
 Copernicus, Nicholas
 Coulter, J. M.
 Crookes, Sir William
 Cuvier, Baron George
 Dalton, John
 Dana, J. D.
 Darwin, C. R.
 Davy, Sir Humphry
 Dawson, G. M.
 Dawson, Sir J. W.
 Drummond, Henry
 Edison, T. A.
 Fahrenheit, G. D.
 Faraday, Michael
 Franklin, Benjamin
 Galileo
 Galvani, Luigi
 Gray, Asa
 Helmholtz, H. L. F. von
 Henry, Joseph
 Herschel, Caroline L.
 Herschel, Sir J. F. W.
 Herschel, Sir William
 Humboldt, Alexander
 Huxley, T. H.
 Kepler, Johann
 Koch, Robert
 Laplace, P. S.
 Lavoisier, A. L.
 Le Conte, Joseph
 Liebig, Justus von
 Linnæus, Carolus

Lister, Sir Joseph
 Lyell, Sir Charles
 Michelson, A. A.
 Miller, Hugh
 Mitchell, Maria
 Murchison, Sir R. I.
 Newcomb, Simon
 Newton, Sir Isaac
 Osler, Sir William
 Pasteur, Louis
 Pinchot, Gifford
 Priestley, Joseph
 Proctor, R. A.
 Ptolemy
 Remsen, Ira
 Ritter, Karl
 Seton, E. T.
 Silliman, Benjamin
 Thomson, Sir William
 Tyndall, John
 Van Hise, C. R.
 Young, C. A.

XV. Soldiers and Naval Commanders

From earliest times the art of warfare has been an influential factor in national and international life. An international court of arbitration is no longer an impossible dream, thanks to The Hague Tribunal and the growing demand for the peaceful settlement of disputes between nations; but as yet warfare has not lost its importance. For noted soldiers and naval commanders, see:

Alcibiades
 Alexander the Great
 Allen, Ethan
 André, John
 Arnold, Benedict
 Beauregard, P. G. T.
 Black Hawk
 Black Prince
 Blücher, G. L. von
 Braddock, Edward
 Bragg, Braxton
 Brock, Sir Isaac
 Buckner, S. B.
 Buell, D. C.
 Bülow, F. W.
 Burgoyne, John
 Butler, B. F.
 Cæsar, C. J.

BIOGRAPHY

Campbell, Sir Colin
 Chaffee, A. R.
 Charlemagne
 Cimon
 Cincinnatus
 Clark, G. R.
 Clinton, Sir Henry
 Clive, Robert
 Condé, Louis
 Cornwallis, Charles
 Cortez, Hernando
 Custer, G. A.
 Decatur, Stephen
 Dewey, George
 Early, J. A.
 Epaminondas
 Estaing, C. H.
 Evans, R. D.
 Ewell, R. S.
 Fairfax, Thomas
 Farragut, D. G.
 Foote, A. H.
 Forrest, N. B.
 Fremont, J. C.
 Funston, Frederick
 Gates, Horatio
 Goethals, G. W.
 Gomez Y Baez, Maximo
 Gordon, C. G.
 Grant, F. D.
 Grant, U. S.
 Grasse, F. J. P.
 Greene, Nathanael
 Grouchy, Emmanuel
 Hale, Nathan
 Halleck, H. W.
 Hampton, Wade
 Hancock, W. S.
 Hannibal
 Havelock, Sir Henry
 Hood, Joseph
 Hooker, Joseph
 Houston, Sam
 Howard, O. O.
 Howe, Richard
 Howe, Sir William
 Hull, Isaac
 Hull, William
 Hunter, David
 Jackson, T. J. (Stonewall)
 Johnson, Sir William
 Johnston, A. S.
 Johnston, J. E.

INDEX

Jones, John Paul
 Kalb, Johann
 Kitchener, H. H.
 Knox, Henry
 Komura, Jutaro
 Kuroki, Itei
 Lafayette, M. J.
 Lawrence, James
 Lee, Charles
 Lee, Fitzhugh
 Lee, Henry
 Lee, R. E.
 Logan, J. A.
 Longstreet, James
 Lyon, Nathaniel
 MacArthur, Arthur
 McClellan, G. B.
 McClelland, J. A.
 McCook, A. M.
 Magruder, J. B.
 Mahan, A. T.
 Marion, Francis
 Marius, Caius
 Mark Antony
 Marlborough, J. C.
 Meade, G. G.
 Miles, N. A.
 Miltiades
 Moltke, H. K. B.
 Monk, George
 Montcalm, L. J.
 Morgan, J. H.
 Moultrie, William
 Napier, Sir C. J.
 Napoleon I
 Nelson, Horatio
 Ney, Michel
 Nogi, Kiten
 Ord, E. O. C.
 Otis, E. S.
 Oyama, Iwao
 Pemberton, J. C.
 Perry, O. H.
 Pillow, G. J.
 Pizarro, Francisco
 Polk, Leonidas
 Pompey
 Pontiac
 Pope, John
 Porter, David
 Porter, D. D.
 Porter, Fitz John
 Porter, Horace

Prescott, William
 Price, Sterling
 Pulaski, Casimir
 Putnam, Israel
 Regulus, M. A.
 Roberts, Sir F. S.
 Rosecrans, W. S.
 Saint Clair, Arthur
 Sampson, W. T.
 Santa Anna
 Schley, W. S.
 Schofield, J. M.
 Schuyler, P. J.
 Scipio, P. C.
 Scipio, P. C. A.
 Scott, Winfield
 Shafter, W. R.
 Sheridan, P. H.
 Sherman, W. T.
 Sickles, D. E.
 Sigsbee, C. D.
 Smith, E. K.
 Standish, Miles
 Stark, John
 Steuben, F. W. von
 Stuart, J. E. B.
 Sulla, L. C.
 Sumter, Thomas
 Taylor, Zachary
 Tecumseh
 Themistocles
 Theodoric
 Thomas, G. H.
 Tilly, J. T.
 Togo, Heihachiro
 Wallace, Lewis
 Wallenstein, A. E. W. von
 Wayne, Anthony
 Webb, A. S.
 Wellington, A. W.
 Wheeler, Joseph
 Wilkes, Charles
 Wolfe, James
 Wood, Leonard
 Worden, J. L.

XVI. Statesmen and Orators

"Peace hath her victories no less than war." The heroes of the peaceful administration of nations may not be as spectacular as those of war, but they have made more permanent contribu-

tions to civilization. For noted statesmen and orators, see:

Aberdeen, J. C. G.
 Adams, C. F.
 Adams, John
 Adams, J. Q.
 Adams, Samuel
 Aldrich, N. W.
 Allison, W. B.
 Aristides
 Arthur, C. A.
 Asquith, H. H.
 Bacon, Francis
 Balfour, A. J.
 Benton, T. H.
 Beveridge, A. J.
 Bismarck-Schönhausen
 Blaine, J. G.
 Bolingbroke, H. St. J.
 Bolivar, Simon
 Bradford, William
 Breckenridge, J. C.
 Bright, John
 Bryan, W. J.
 Bryce, James
 Buchanan, James
 Burke, Edmund
 Burr, Aaron
 Calhoun, J. C.
 Canning, George
 Cannon, J. G.
 Carnot, M. F. S.
 Casimir-Périer, J. P. P.
 Cass, Lewis
 Cassius, Longinus Caius
 Cato, M. P. (The Censor)
 Cato, M. P. (of Utica)
 Cavour, C. B. di
 Chamberlain, Joseph
 Choate, J. H.
 Choate, Rufus
 Churchill, Lord R. H. S.
 Cicero, M. T.
 Clark, Champ
 Clay, Henry
 Cleveland, Grover
 Clinton, De Witt
 Clinton, George
 Cobden, Richard
 Colbert, J. B.
 Colfax, Schuyler
 Conkling, Roscoe
 Cromwell, Thomas

INDEX

Cullom, S. M.
 Cummins, A. B.
 Curzon, G. N.
 Cushing, Caleb
 Davis, Jefferson
 Demosthenes
 Diaz, Porfirio
 Dingley, Nelson, Jr.
 Dinwiddie, Robert
 Disraeli, Benjamin
 Dolliver, J. P.
 Douglas, S. A.
 Endicott, John
 Evarts, W. M.
 Everett, Edward
 Fairbanks, C. W.
 Fallières, C. A.
 Fessenden, W. P.
 Fillmore, Millard
 Fish, Hamilton
 Folk, J. W.
 Foraker, J. B.
 Foster, J. W.
 Fox, C. J.
 Franklin, Benjamin
 Gambetta, Léon
 Garcia Y Iniguez, Calixto
 Garfield, J. A.
 Garibaldi, Giuseppe
 Gladstone, W. E.
 Gomez Y Baez, Maximo
 Greeley, Horace
 Grévy, F. P. J.
 Grey, Sir A. H.
 Hamilton, Alexander
 Hamlin, Hannibal
 Hampden, John
 Hancock, John
 Harrison, Benjamin
 Harrison, W. H.
 Hastings, Warren
 Hay, John
 Hayes, R. B.
 Hayne, R. Y.
 Hendricks, T. A.
 Henry, Patrick
 Hill, D. J.
 Hitchcock, E. A.
 Hoar, G. F.
 Ingalls, J. J.
 Ingersoll, R. G.
 Ito, Hirobumi
 Jackson, Andrew

Jay, John
 Jefferson, Thomas
 Johnson, Andrew
 King, Rufus
 Knox, P. C.
 Kosciusko, Thaddeus
 Kossuth, Louis
 La Follette, R. M.
 Lamont, D. S.
 Laurens, Henry
 Laurier, Sir Wilfrid
 Lee, R. E.
 Li Hung Chang
 Lincoln, Abraham
 Livingston, R. R.
 Lloyd-George, David
 Lodge, H. C.
 Loubet, Emile
 Macdonald, Sir J. A.
 Mackenzie, Alexander
 Mackenzie, W. L.
 McKinley, William
 MacVeagh, Wayne
 Madero, F. I.
 Madison, James
 Meyer, G. von L.
 Milner, Sir A. M.
 Minto, G. J.
 Mirabeau, G. H. R.
 Monroe, James
 Montfort, Simon de
 Morley, John
 Morris, Gouverneur
 Morton, O. P.
 North, Frederick
 O'Connell, Daniel
 O'Connor, T. P.
 Olney, Richard
 Otis, James
 Paine, R. T.
 Palma, T. E.
 Parnell, C. S.
 Pauncefote, Julian
 Pericles
 Phillips, Wendell
 Phips, Sir William
 Pickering, Timothy
 Pierce, Franklin
 Pinckney, Charles
 Pinckney, C. C.
 Pitt, William (First Earl of Chatham)
 Pitt, William
 Polk, J. K.

BIOGRAPHY

Pym, John
Quincy, Josiah
Randolph, E. J.
Randolph, John
Reed, T. B.
Reid, Whitelaw
Rhodes, C. J.
Richelieu, A. J.
Roosevelt, Theodore
Root, Elihu
Roseberry, A. P. P.
Rutledge, Edward
Rutledge, John
Salisbury, R. A. T.
Schurz, Carl
Seward, W. H.
Seymour, Horatio
Shaftesbury, A. A. C.
Sherman, J. S.
Sherman, John
Sherman, Roger
Sidney, Sir Philip
Smith, Hoke
Spooner, J. C.
Stanton, E. M.
Stephens, A. H.
Strathcona and Mount Royal, D. A. S.
Straus, O. S.
Stuyvesant, Peter
Sumner, Charles
Sun Yat-Sen
Taft, W. H.
Talleyrand-Périgord
Taylor, Zachary
Tell, William
Thurman, A. G.
Tilden, S. J.
Tillman, B. R.
Tupper, Sir Charles
Turgot, A. R. J.
Tyler, John
Van Buren, Martin
Vane, Sir Henry
Vilas, W. F.
Wade, B. F.
Waldeck-Rousseau, P. M. E.
Wallace, Sir William
Walpole, Horace
Warren, Joseph
Warwick, R. N.
Washington, George
Webster, Daniel
Whitney, W. C.

INDEX

Williams, J. S.
Wilson, James
Wilson, W. L.
Wilson, Woodrow
Winslow, Edward
Winthrop, John
Winthrop, John, Jr.
Wise, H. A.
Witte, S. J.
Wolsey, Thomas
Yuan Shih-Kai

XVII. Theologians, Preachers and Religious Leaders

The religious leaders of the world have aimed to control men's lives for righteousness by an appeal to the inner motives that have their springs in a conscious relationship to the Supreme Being. The following list of such leaders includes theologians, preachers, priests, missionaries and religious reformers:

Abelard, Pierre
Ambrose, St.
Aquinas, St. Thomas
Arminius
Athanasius, St.
Augustine, St.
Baxter, Richard
Becket, Thomas
Beecher, H. W.
Beecher, Lyman
Brooks, Phillips
Calvin, John
Campbell, Alexander
Carey, William
Chalmers, Thomas
Channing, W. E.
Chrysostum, St. John
Clark, F. E.
Clarke, J. F.
Collyer, Robert
Confucius
Cotton, John
Cranmer, Thomas
Dominic, St.
Dowie, J. A.
Duns Scotus, John
Eddy, Mary B. G.
Edwards, Jonathan
Eliot, John
Erasmus, Desiderius

Fairbairn, A. M.
 Fallows, Samuel
 Farrar, F. W.
 Feehan, P. A.
 Fénelon, François
 Fox, George
 Francis of Assisi, St.
 Gladden, Washington
 Gregory VII
 Gunsaulus, F. W.
 Hale, E. E.
 Hillis, N. D.
 Hirsch, E. G.
 Hooker, Richard
 Hooker, Thomas
 Huss, John
 Irenæus, St.
 Jones, J. L.
 Judson, Adoniram
 Kingsley, Charles
 Knox, John
 Latimer, Hugh
 Laud, William
 Leo X
 Leo XIII
 Livingstone, David
 Loyola, St. Ignatius of
 Loyson, Charles
 Luther, Martin
 Manning, H. E.
 Mather, Cotton
 Mather, Increase
 Melancthon, Philip
 Mohammed
 Moody, D. L.
 Mott, J. R.
 Origen,
 Parker, Theodore
 Parkhurst, C. H.
 Pascal, Blaise
 Pius X
 Potter, H. C.
 Priestley, Joseph
 Quayle, W. A.
 Raikes, Robert
 Renan, Ernest
 Robinson, John
 Savonarola, Girolamo
 Simpson, Matthew
 Smith, Joseph
 Spurgeon, C. H.
 Strauss, D. F.
 Swedenborg, Emanuel

Talmage, T. D.
 Taylor, Jeremy
 Tertullian, Q. S. F.
 Thomas à Kempis
 Vincent, J. H.
 Watson, John
 Watts, Isaac
 Wesley, Charles
 Wesley, John
 Whitefield, George
 Wiclif, John
 Williams, Roger
 Wolsey, Thomas
 Young, Brigham
 Zoroaster
 Zwingli, Ulrich

See also Index, Department of Religion and Theology.

XVIII. Noted Women

Women have in all ages been at the heart of life and of progress; not always in a spectacular way, but always in a real way. "The hand that rocks the cradle is the hand that rules the world." Most of the noted women here given will be found listed also in the above departments. They are now gathered together as a matter of interest and convenient reference.

Adams, Maude K.
 Addams, Jane
 Anthony, Susan B.
 Barton, Clara
 Bernhardt, Sarah
 Booth, Maud
 Catherine II
 Cleopatra
 Darling, Grace
 Deborah
 Eddy, Mary B. G.
 Eugénie-Marie
 Herschel, Caroline L.
 Howe, Julia W.
 Hypatia
 Isabella
 Joan of Arc
 Josephine, Empress
 Keller, Helen A.
 Lind, Jenny
 Livermore, Mary A. R.
 Lucretia

Lyon, Mary M.
 Maria Theresa
 Marie Antoinette
 Mary Stuart
 Mitchell, Maria
 Nightingale, Florence
 Octavia
 Palmer, Alice F.
 Patti, Adelina J. M.
 Stanton, Elizabeth C.
 Terry, Ellen A.
 Washington, Martha
 Willard, Frances E.
 Victoria

BUSINESS AND FINANCE

The subjects of Business and Finance deal with the means, methods and agencies of conducting business. For a fuller treatment of industry, the reader should consult in the Index the allied departments of Economics and Social Science, and Transportation and Communication.

I. Money and Banking

Business, except primitive barter, cannot be conducted without a medium of exchange. This medium may be money or some substitute for money, such as is provided by credit and the various forms of negotiable paper. See:

Assay Office
 Banks and Banking
 Bill of Credit
 Bill of Exchange
 Bimetallism
 Bond
 Building and Loan Associations
 Check
 Clearing House
 Continental Money
 Counterfeiting
 Credit
 Credit, Letter of
 Currency
 Dollar
 Draft
 Due Bill
 Fiat Money
 Gresham's Law
 Mint

Money
 Money Order
 Negotiable Paper
 Penny
 Pine-Tree Shilling
 Postal Savings Banks
 Promissory Note
 Tender, Legal

II. Methods and Agencies

Aside from Money and Banking, which may be called the means of conducting business, there are various subjects connected with business methods and agencies that should be considered. See:

Agent
 Annuity
 Bankrupt Law
 Bill of Lading
 Bill of Sale
 Board of Trade
 Bookkeeping
 Bulls and Bears
 Commerce
 Commerce, Associations of
 Commerce, Department of
 Commercial Law
 Common Carrier
 Contract
 Corporation
 Corporations, Bureau of
 Custom-House
 Insurance
 Joint-Stock Company
 Lloyd's
 Partnership
 Sherman Anti-Trust Law
 Standard Oil Company
 Stock Exchange
 Stock Jobbing
 Tariff
 Trade-Mark
 Trusts
 United States Steel Corporation

III. Biographies

For the lives of some of the world's prominent financiers and business men, see:

Astor, J. J.
 Carnegie, Andrew

Cooke, Jay
Cooper, Peter
Gallatin, Albert
Gould, Jay
Harriman, E. H.
Hill, J. J.
Morgan, J. P.
Morris, Robert
Rockefeller, J. D.
Rothschild
Sherman, John
Vanderbilt, Cornelius
Wanamaker, John

IV. Books

For further reading the following books will be found helpful:

Jevons, *Money and the Mechanism of Exchange*; Laughlin, *The Principles of Money*; Shaw, *The History of Currency*; Watson, *The History of American Coinage*; Sumner, *History of Banking in the United States*; White, *Money and Banking*; Lisle, *Accounting in Theory and Practice*; Dawson, *American Business and Banking Encyclopedia*; Lewis, *Commercial Organization and Factories*; Dodd, *Trusts*; Ely, *Monopolies and Trusts*; Hobson, *Evolution of Modern Capitalism*.

BOTANY

Botany is the science of plants. It deals with their entire life,—with how they breathe, feed, grow and reproduce themselves; with their origin, structure, life processes, classification and distribution. The study of the structure of plants is known as Plant Anatomy; the consideration of their life processes is called Plant Physiology; and both together constitute General Botany. Systematic Botany deals with the description and classification of plants. Economic Botany treats of the practical aspects of Botany, including Agriculture, Horticulture and Forestry.

The latter department should be consulted in the Index for fuller treatment.

For general articles, see:

Biology
Botany
Evolution

I. General Botany

This general division of Botany deals with Plant Anatomy and Physiology; that is, with the structure and form of the plant, including its cells, tissues, organs and parts; and with the processes that characterize the life of the plant, including the internal and external conditions of growth. See:

Bark	Leaf
Bud	Morphology
Bulb	Pollen
Cell	Protoplasm
Chlorophyll	Root
Flower	Seed
Fruit	Spore
Germination	Stem

II. Systematic Botany

This department of Botany deals with the classification of plants, together with the description of the species, genera, families and other divisions into which they are grouped. It also treats of the geographical distribution of plants. The two main divisions under which plants may be classified and described are *Cryptogams*, or Flowerless Plants, and *Phanerogams*, or Flowering Plants.

For general article, see Botany, sub-head Classification.

1. CRYPTOGRAMS, OR FLOWERLESS PLANTS

Cryptogams reproduce themselves by spores rather than by flowers and seeds. See:

Bacteria	Fungus
Cryptogam	Mold
Ferns	Moss

See also—

Alga	Lichen
Brake	Liverworts
Club Moss	Maidenhair
Diatom	Mushrooms
Dry Rot	Seaweed
Ergot	Sphagnum
Horsetail	Truffle
Irish Moss	Wilt
Kelp	Yeast

2. PHANEROGAMS, OR FLOWERING PLANTS

It is through the flower that these plants produce the seed or fruit and so

INDEX

reproduce themselves. This is the biological value of the flower. But many flowers have also an æsthetic significance, and greatly add to the world's beauty. It is for this reason that most people are interested in flowers.

Flowering plants are divided into Herbs, Shrubs and Trees.

A. Herbs

Herbs are plants which contain no woody tissue and which die down after production of the seed. It is not advisable to list the large number of plants included in this division. For those typical of the class or family which they represent, see:

Herb	Geranium
Air Plants	Gladiolus
Aquatic Plants	Goldenrod
Arbutus	Grass
Asphodel	Ground Ivy
Aster	Heliotrope
Begonia	Hellebore
Bindweed	Hibiscus
Boehmeria	Hollyhock
Buttercup	Honeysuckle
Cactus	Hyacinth
Calceolaria	Hyssop
Calla	Iris
Camas	Knotgrass
Cardinal Flower	Lady's Slipper
Cat-Tail	Lily
Cereus	Lily-of-the-Valley
Chrysanthemum	Loco Weed
Clematis	Lotus
Compass Plant	Lupine
Convolvulus	Mallow
Cornel	Mandrake
Daffodil	Maté
Dahlia	Mignonette
Daisy	Milkweed
Dandelion	Mistletoe
Day Lily	Morning-Glory
Edelweiss	Mullein
Elecampane	Mustard
Fennel	Nasturtium
Forget-me-not	Nightshade
Four-o'clock	Orchid Family
Foxglove	Pansy
Fuchsia	Passion Flower
Gentian	Peony

Petunia	Stickseed
Phlox	Sundew
Pink	Sunflower
Pitcher Plant	Teasel
Plantain	Thistle
Poison Ivy	Trillium
Pokeweed	Tuberose
Poppy	Tulip
Primrose	Venus's Flytrap
Rafflesia	Verbena
Sedge	Victoria
Sensitive Plant	Water Hyacinth
Shamrock	Water Lily
Smilax	Weeds
Solomon's Seal	Wood Sorrel
Sorrel	Yucca

B. Shrubs

Shrubs are perennial plants which have a woody stem. They are distinguished from trees by their low stature and by the fact that several stems usually arise from a point at or near the ground. See:

Alder	Laurel
Alligator Pear	Leatherwood
Arbor Vitæ	Mesquite
Azalea	Oleander
Barberry	Osage Orange
Bittersweet	Osier
Box	Prickly Ash
Bramble	Prickly Pear
Broom	Privet
Buckthorn	Rhododendron
Dogwood	Rose
Elder	Sagebrush
Hackberry	Spirea
Hawthorn	Sumac
Hazel	Sweetbrier
Heath	Syringa
Holly	Tamarisk
Huckleberry	Trumpet Creeper
Hydrangea	Viburnum
Ivy	Virginia Creeper
June Berry	Wax Myrtle
Juniper	Wistaria
Laburnum	Witch-Hazel

C. Trees

Trees are perennial plants which have a single, woody stem or trunk rising some distance from the ground before

the branches appear. See Index, Department of Horticulture and Forestry, subheads Horticulture and Forestry.

III. Economic Plants

The third main division of Botany deals with the plants which are valuable for economic purposes, including those utilized in Agriculture, Horticulture and Forestry. The latter plants are treated more fully under the Department of Horticulture and Forestry.

1. FIBER PLANTS

Fiber plants are used in the manufacture of ropes, cordage, mats, coarse cloth and, to a limited extent, of paper. See:

Agave	Manila
Bœhmeria	Nettle
Coir	Papyrus
Esparto	Raffia
Flax	Rattan
Hemp	Sisal

2. MEDICINAL PLANTS

Certain plants have medicinal qualities and are used in the manufacture of drugs. See:

Aconite	Eucalyptus
Arrowroot	Garlic
Balm	Ginseng
Balsam	Hemlock
Bergamot	Hop
Betel	Horehound
Bloodroot	Hyssop
Boneset	Jalap
Buck Bean	Licorice
Calabar Bean	Lobelia
Cassia	Manna
Catnip	Nux Vomica
Chamomile	Poppy
Cinchona	Sassafras
Coca	Senna
Cola	Spikenard
Colchicum	Squill
Colocynth	Tansy
Cubeb	Wormwood
Cumin	Yarrow
Dandelion	

3. SPICES AND PERFUMES

Most spices and perfumes are manufactured from plants. See: Spices.

Acacia	Lavender
Allspice	Mace
Aloewood	Mallow
Anise	Mustard
Caper	Myrrh
Caraway	Nutmeg
Cardamon	Pepper
Cassava	Peppermint
Cayenne Pepper	Sage
Cinnamon	Sassafras
Clove	Sesamum
Coriander	Sweet Flag
Dill	Thyme
Ginger	Umbelliferæ
Jasmine	Wintergreen

4. GUMS AND DYES

The following plants are used for gums and dyes:

Annatto	Indigo
Brazilwood	Lac
Camwood	Logwood
Chicle	Madder
Copal	Manna
Guayule	Pitch
Gum	Saffron
Gum Resin	Spruce
Gutta-Percha	Tragacanth

IV. Unclassified and Related Topics

For other topics connected with the subject of Botany, see:

Amber
Angiosperm
Antiseptics
Antitoxin
Bacteria
Bird's-Nest
Botanical Garden
Cork
Creosote
Cross-Fertilization
Diseases of Plants
Disinfectant
Ecology
Fermentation
Flowers, Language of
Flowers, National and State

INDEX

Fungicide
Galls
Greenhouse
Gymnosperm
Hotbed and Cold Frame
Insecticide
Mendel's Law
Peat

V. Biographies

For some of the prominent botanists, see:

Candolle, Augustin Pyramus de
Gray, Asa
Jussieu, Antoine Laurent de
Linnæus, Carolus

VI. Books

For further information on the subject of Botany, the following books may be consulted:

Atkinson, *Elementary Botany*; Bailey, *Botany*; Barnes, *Plant Life*; Bessey, *Botany for High Schools and Colleges*; Brinton and Brown, *Illustrated Flora of the North United States*; Darwin, *Origin of Species*; Gray, *Manual of Botany*; Smith, *Bacteria in Relation to Plant Diseases*; Kerner and Oliver, *Natural History of Plants*.

Excellent books for the identification of plants and flowers are: Matthews, *Fieldbook of American Wild Flowers*; Lounsberry, *Southern Wild Flowers and Trees*; Dana, *How to Know the Wild Flowers*; Reed, *Wild Flowers East of the Rockies*.

CHEMISTRY

Chemistry is the science that treats of the composition, relations and transformations of material substances. It is no longer an academic science. Its results are being applied in almost every branch of industry. For this reason a knowledge of the principles and facts of Chemistry is important for everyone. The following classification will enable the reader to gain such a knowledge by referring to the designated articles in the body of the encyclopedia.

For general articles, see:

Chemistry	Litmus
Laboratory	Science

I. Principles of Chemistry

If chemistry is to be adequately understood, there are certain fundamental principles that should be studied. These will be found in the following articles:

Chemistry (general article)

Actinism	Distillation
Affinity	Element
Allotropy	Ferment
Atom	Fermentation
Atomic Theory	Flame
Base	Gas
Combustion	Molecule
Compound	Putrefaction

II. Elements

The chemical element is a substance all of whose particles are found upon analysis to be composed of the same kind of matter. These elements may be gases, liquids or solids, and include some of the most useful minerals. See:

Aluminum	Mercury
Antimony	Nickel
Argon	Nitrogen
Arsenic	Osmium
Barium	Oxygen
Bismuth	Phosphorus
Boron	Platinum
Bromine	Potassium
Cadmium	Radium
Calcium	Rubidium
Carbon	Selenium
Chlorine	Silicon
Chromium	Silver
Cobalt	Sodium
Glucinum	Strontium
Gold	Sulphur
Hydrogen	Tellurium
Iodine	Thallium
Iridium	Tin
Lead	Titanium
Lithium	Tungsten
Magnesium	Uranium
Manganese	Zinc

INDEX

III. Compounds

When two or more chemical elements unite they form a compound. Chemical compounds were formerly classed as organic or inorganic, according to whether they were produced by living organisms or not. More recently, however, Organic Chemistry has been designated as the chemistry of carbon compounds, since it has been discovered that these compounds can be produced otherwise than by living organisms, and that all of them contain carbon. See:

Acetic Acid	Lake
Acid	Logwood
Alkali	Madder
Alum	Mordants
Ammonia	Muriatic Acid
Aniline	Nitric Acid
Annatto	Nitrobenzol
Ashes	Oils
Borax	Oxalic Acid
Camphor	Picric Acid
Carbolic Acid	Pigments
Carbon Dioxide	Potash
Chloral	Prussic Acid
Chloride of Lime	Resin
Chloroform	Saffron
Choke Damp	Sal Ammoniac
Citric Acid	Salicylic Acid
Cocaine	Salt
Cochineal	Saltpeter
Corrosive Sublimate	Sepia
Cyanogen	Soda
Dyeing	Stearin
Elixir	Sulphuric Acid
Ferment	Tannin
Fire Damp	Tartaric Acid
Formic Acid	Thymol
Gas	Umber
Gum	Vaseline
Gum Resin	Water
Hydrofluoric Acid	Woad
Ink	

IV. Biographies

For the lives of some of the noted chemists, see:

Achard, F. K.
Bunsen, R. W.
Cavendish, Henry
Crookes, Sir William

Dalton, John
Davy, Sir Humphry
Faraday, Michael
Lavoisier, A. L.
Liebig, Justus von
Pasteur, Louis
Priestley, Joseph
Remsen, Ira
Silliman, Benjamin

V. Books

For further reading and study, the following books may be consulted:

Clarke and Dennis, *Elementary Chemistry*; Jones, *Elements of Physical Chemistry*; Meyer, *History of Chemistry*; Remsen, *Introduction to the Study of Chemistry, Organic Chemistry, and Inorganic Chemistry*; Richter, *Chemistry of the Carbon Compounds*, translated by Smith; Meyer, *Modern Theories of Chemistry*; Sadtler, *A Handbook of Industrial Organic Chemistry*; Richards, *The Chemistry of Cooking and Cleaning*.

Some of the periodicals are: *Journal of the Chemical Society of London*; *Journal of the American Chemical Society*; *American Chemical Journal*.

DOMESTIC SCIENCE

Domestic science is that department of knowledge that has to do with household economics. Household affairs are as old as the family; but it is only within a generation that they have been reduced to a recognized branch of scientific study. Domestic Science is now being introduced into the schools as the correlative of Manual Training for boys. There is no good reason why household affairs should not be as scientifically and systematically conducted as Agriculture and other industries.

For general article, see Domestic Science.

I. House Furnishings

Many of the commonest articles in use in the home are manufactured by methods with which few are familiar

The development of these industries and the way in which their products are used in other lands are also matters of interest and importance. See:

Bed	Needle
Book	Paper Hangings
Brush	Pin
Carpet	Pottery
Clock	Sewing Machine
Electricity, Uses in	Shears
the Home	Stove
Filter	Tapestry
Furnace	Vacuum Cleaner
Lacquer Ware	Vase
Lamp	Water Meter
Linoleum	

II. Dress

The question of dress is an important one in domestic economics.

For general article, see Dress.

1. DRESS MATERIALS

For clothing materials, see:

Alpaca	Jute
Boehmeria	Lace
Calico	Linen
Cashmere Goat	Satin
Cotton	Sheep
Crape	Silk
Crinoline	Silk, Artificial
Flax	Tartan
Fur	Velvet
Hair	Whalebone
Hemp	Wool, Manufacture of

2. ARTICLES OF CLOTHING

For articles of clothing, see:

Bonnet	Hat
Boots and Shoes	Jewelry
Button	Moccasin
Cap	Sandal
Embroidery	Shawl
Fan	Thread
Gauntlet	Toga
Glove	

3. TOILET ARTICLES

For toilet articles, see:

Brush	Rouge
Mirror	Soap
Perfumes	

III. Foods

Food is the fuel that feeds the fires of physical life. Its quantity and quality should not be left to chance or convenience, or even altogether to taste, but should be specifically adapted to its primary purpose. See:

Food	Mutton
Adulteration	Oleomargarine
Baking Powder	Olive Oil
Balsam	Pork
Beef	Potash
Beef, Extract of	Proteids
Biscuit	Raisins
Bread	Saccharine
Butter	Salt, Common
Candy	Sausage
Canning	Soda
Corn	Spices
Cream of Tartar	Starch
Eggs	Stimulant
Flour	Sugar
Gelatin	Tallow
Glucose	Tapioca
Glucose Sirup	Tomato
Lard	Vanilla
Macaroni	Vinegar
Milk	

See also Index, Departments of Agriculture, subheads Crops, Crop Products, Dairying, Poultry and Bees; Botany, subhead Spices and Perfumes; Horticulture and Forestry, subheads Fruit Trees and Fruits, Vegetables, Horticultural and Forestry Products.

IV. Sanitation

Another important branch of Domestic Economics is the care of the house, so that it shall minister to the health of its inmates. See: Index, Medicine and Health, subhead Hygiene and Sanitation.

V. Miscellaneous

For other articles connected with Domestic Science, see:

Dyeing
Weights and Measures

VI. Books

For further study, the following books may be consulted:

Richards, *Euthenics*; Vulté, *Laboratory Notes in Household Chemistry*; James, *Housekeeping for Two*; Richards, *The Chemistry of Cooking and Cleaning*; Carpenter, *How the World is Housed*; Clark, *Domestic Science*, Kittredge; *Housekeeping Notes*; Leverton, *Housekeeping Made Easy*; Ravenhill, *Household Administration*.

ECONOMICS AND SOCIAL SCIENCE

The term *Social Sciences* is used in a broad sense to designate those branches of study that deal with the community life of men,—such as Ethnology, Economics, Jurisprudence, Political Science, Sociology and Social History. There is also a strong tendency to include Ethics and even Psychology among the Social Sciences.

The term *Social Science* is used in a specific way, however, as practically synonymous with Sociology; and it is in this sense that it is employed in this classification. The remaining Social Sciences, aside from Economics and Sociology, are treated in other departments.

ECONOMICS

Economics, or Political Economy, is the science of wealth. Human life has a physical basis. Among the primary needs of life, therefore, are those which have to do with physical sustenance. Economics deals with the material means for the satisfaction of these needs, treating the principles or laws of the production, distribution and consumption of goods. See:

Political Economy
Capital
Child Labor
Communism
Consumption
Cooperation
Corporation
Distribution

Division of Labor
Exposition, Industrial
Factory
Interest
Labor, American Federation of
Labor Organizations
Laissez Faire
Panic
Production
Profit Sharing
Rent
Socialism
Strikes and Lockouts
Tariff
Tax
Trusts
Wages

SOCIAL SCIENCE

Social Science, or Sociology, is the new science that treats of associative human life. It investigates the phenomena of social relations, both in the present and in the past, with a view to the determination of their laws, the true social ideal, and the incorporation of that ideal in society. It has therefore a philosophical, a scientific and a practical aspect.

For general articles, see:

Sociology
Anthropology and Ethnology (Index)
History (Index)

I. Social Philosophy

The attempt to determine the general laws of associative life and to formulate the social ideal may appropriately be called social philosophy. In addition to the general article on Sociology and the writings of sociologists, see:

Anarchism
Augustine, Saint (The City of God)
Blanc, J. J. L.
Brook Farm
Communism
Cooperation
Fourier, F. M. C.
George, Henry
Marx, Karl
More, Sir Thomas (Utopia)
Nihilism

Plato (Republic)
Proudhon, P. J.
Saint-Simon, C. H.
Socialism

II. Social Structure and Functions

Just as the structure of the body is made up of the various bodily organs that perform its functions, so also the structure of society may be regarded as consisting of the various institutions and social organizations through which the work of society is carried on. These include all of the industrial, commercial, governmental, educational and religious institutions of society, many of which are treated in other departments. See:

Agriculture (Index)
Business and Finance (Index)
Domestic Science (Index)
Education (Index)
Horticulture and Forestry (Index)
Law and Political Science (Index)
Marriage
Mechanic Arts (Index)
Organizations and Clubs (Index)
Religion and Theology (Index)
Transportation and Communication (Index)

III. Social Betterment

There are wrong adjustments, or "diseases," in society, just as there are in the individual. The consideration of these is known as Social Pathology. The various agencies directed toward the betterment of these conditions may well be studied at the same time. See:

Medicine and Health (Index)
Bertillon System
Blind, Education of the
Boys and Girls Clubs
Boy Scouts of America
Building and Loan Associations
Camp Fire Girls
Capital Punishment
Child Labor
Convict Labor
Deaf and Dumb, Education of the
Factory
George Junior Republic

Hampton Normal and Agricultural Institute
Hull House (See Social Settlements)
Illiteracy
Insane, Care of the
Juvenile Court
Negro, Education of the
Old-Age Pension (See Pension)
Parcel Post
Parole
Postal Savings Bank
Prison
Prohibition
Smuggling
Social Settlements
Sweating System (See Factory)
Tuskegee Normal and Industrial Institute
Woman's Christian Temperance Union

IV. Miscellaneous Topics

For other topics connected with Sociology, see:

Census
Immigration
Naturalization

BIOGRAPHIES AND BOOKS

I. Biographies

A. For the lives of prominent writers on political economy, see:

Atkinson, Edward
Ely, R. T.
Fawcett, Henry
Jenks, J. W.
Laughlin, J. L.

B. For the lives of social workers, see:

Addams, Jane
Howard, John
Howe, S. G.
Owen, Robert
Taylor, Graham
Washington, Booker T.

C. For writers on Sociology, see:

Comte, I. A.
Giddings, F. H.
Henderson, C. R.
Small, A. W.
Ward, L. F.
Vincent, G. E.

II. Books

For further reading on the subjects of economics and social science, the writings of the men listed above may be consulted. The following books will be found especially helpful: Fairbanks, *Introduction to Sociology*; Small and Vincent, *Introduction to the Study of Society*; Henderson, *Social Elements*; Giddings, *Theory of Sociology*; Small, *General Sociology*; Bullock, *Introduction to the Study of Economics*; Ely, *Outlines of Economics*; Hadley, *Economics*; Laughlin, *Political Economy*; Ingram, *A History of Political Economy*.

EDUCATION

In a general sense, Education is the development of the whole nature of man, whether in or out of school. The term has come to be used in a more restricted sense, however, to mean the development of the mental and moral faculties through a process of training in schools of learning. More recently, it has been applied in a still more technical sense to that department in educational institutions which deals with the principles and methods of imparting knowledge. In this sense, it may be regarded as the science of teaching. It includes the History and Philosophy of Education, Educational Psychology, Pedagogy and School Management.

For general articles, see:

Education
Education, National Systems of
Pedagogy
Psychology

See also subhead Education under the various national and state articles.

I. The History of Education

Prominent thinkers in all ages have realized the importance of the education of the young by passing on to them the accumulated knowledge and experience of the race, with contemporary additions. It is in this way that civilization is perpetuated and advanced from generation to generation. In ancient times Educa-

tion was closely connected with Philosophy. During the Middle Ages it was allied with Theology. Only in modern times has it developed into an independent discipline. In each nation educational systems have grown up in accordance with the national genius and needs.

1. For ancient and medieval education see:

Abelard, Pierre	Creed
Alcuin	Judaism
Alfred the Great	Mohammedanism
Aristotle	Monasticism
Ascham, Roger	Origen
Augustine, Saint	Plato
Brahmanism	Socrates
Buddhism	Sophists
Catechism	Talmud, The
Charlemagne	Tertullian, Q. S. F.
Chivalry	Universities
Confucius	

2. For the history of modern education, see:

Arnold, Thomas	Locke, John
Bacon, Francis	Loyola, St. Ignatius of
Calvin, John	Luther, Martin
Comenius, J. A.	Mann, Horace
Erasmus,	Melanchthon, Philipp
Desiderius	Milton, John
Fénelon, François	Pestalozzi, J. H.
Francke, A. H.	Reformation, The
Froebel, F. W. A.	Renaissance
Herbart, J. F.	Rousseau, J. J.
Jesuits	Spencer, Herbert
Kindergarten	

II. Educational Psychology

The conclusions of Psychology are becoming of increasing importance in education. For articles on this subject, see: Index, Department of Philosophy and Psychology.

III. Pedagogy

Pedagogy is the art of teaching. Its task is to apply the principles of Psychology to the work of instruction. In addition to the article on Pedagogy, see: Agricultural High School
Blind, Education of the
Child Study
Deaf and Dumb, Education of the

EDUCATION

Deductive Method
Domestic Science
Education, Industrial
Feeble-Minded, Education of the
Habit
Inductive Method
Kindergarten
Manual Training
Montessori Method
Nature Study
Normal School
Physical Culture
Shorthand
Trade Schools
United States Indian Training and Industrial School
University Extension

IV. Educational Institutions

There are many kinds of educational institutions, ranging from the kindergarten to the university, comprising both private and state schools, covering the ground of general and technical training, and including highly organized institutions and general educational agencies. In the United States the more common types of educational agencies are the kindergarten, common schools, high schools, academies, independent colleges, state colleges and universities, and technical and professional schools. The latter include schools for instruction in business, agriculture, engineering, medicine, law, theology and other professions.

1. For general educational agencies, see:

Academy
Blind, Education of the
Business College
Carnegie Foundation for the Advancement of Teaching
Chautauqua Movement
Civics, National School of
Common Schools
Deaf and Dumb, Education of the
Domestic Science
Education, Commissioner of
Education, Compulsory
Education, Industrial
Education, National Systems of
Evening Schools
Feeble-Minded, Education of the

INDEX

General Education Board
High School
Kindergarten
Library
Library of Congress
Manual Training
Nature Study
Negro, Education of the
Normal School
Peabody Education Fund
Rhodes Scholarships
Schools, Correspondence
Slater Fund
Smithsonian Institution
Trade Schools
Universities
University Extension

2. The following are some of the most important educational institutions. Nearly every state has a state university. These universities are described in articles immediately following the article of the state to which they belong. For other universities and colleges, see:

Alabama, University of
Amherst College
Armour Institute of Technology
Berlin, University of
Boston University
Bowdoin College
Brown University
Bryn Mawr (See Women, Colleges for)
Cambridge, University of
Carnegie Institution
Catholic University of America
Chicago, University of
Cincinnati, University of
College of the City of New York
Columbia University
Cooper Union
Cornell University
Dartmouth College
Drexel Institute of Art, Science and Industry
George Washington University
Girard College
Goucher College
Hampton Normal and Agricultural Institute
Harvard University
Heidelberg, University of
Johns Hopkins University
Laval University

INDEX

- Leland Stanford Junior University
 Lewis Institute
 McGill College and University
 Massachusetts Institute of Technology
 Mount Holyoke College (See Women, Colleges for)
 New York University
 Northwestern University
 Notre Dame University
 Oberlin College
 Oxford, University of
 Paris, University of
 Prague, University of
 Princeton University
 Randolph-Macon System of Colleges and Academies
 St. Louis University
 Simmons College (See Women, Colleges for)
 Smith College (See Women, Colleges for)
 Sorbonne
 Tokyo, University of
 Toronto, University of
 Tulane University of Louisiana
 Tuskegee Normal and Industrial Institute
 United States Indian Training and Industrial School
 Vassar College (See Women, Colleges for)
 Vienna, University of
 Washington University
 Wellesley College (See Women, Colleges for)
 William and Mary College
 Williams College
 Yale University

V. Biographies

In addition to the list of educational writers given under the history of education, see for other prominent educators the following:

- Alderman, E. A.
 Angell, J. B.
 Barnard, F. A. P.
 Barnard, Henry
 Brown, E. E.
 Burbank, Luther
 Butler, N. M.
 Claxton, P. P.
 Curie, Pierre and Madame Marie S.

- Dana, J. D.
 Draper, A. S.
 Du Bois, W. E. B.
 Dwight, Timothy
 Eliot, C. W.
 Gilman, D. C.
 Gunsaulus, F. W.
 Hadley, A. T.
 Hall, G. S.
 Harper, W. R.
 Harris, W. T.
 Hart, A. B.
 Hughes, J. L.
 James, E. J.
 James, William
 Jevons, W. S.
 Jordan, D. S.
 Judson, H. P.
 Ladd, G. T.
 Laplace, P. S.
 Laughlin, J. L.
 Lowell, A. L.
 Lyon, Mary M.
 McCosh, James
 Maxwell, W. H.
 Nichols, E. F.
 Northrop, Cyrus
 Palmer, Alice F.
 Parker, F. W.
 Pitman, Sir Isaac
 Porter, Noah
 Pritchett, H. S.
 Ridpath, J. C.
 Schaeffer, N. C.
 Schurman, J. G.
 Sturm, Johann
 Van Hise, C. R.
 Vincent, G. E.
 Vincent, J. H.
 Washington, B. T.
 Webster, Noah
 Wheeler, B. I.
 White, A. D.
 Whitney, W. D.
 Willard, Emma H.
 Wilson, Woodrow
 Worcester, J. E.
 Wright, C. D.
 Young, Ella F.

VI. Books

For further reading the following books may be consulted:

Laurie, *Historical Survey of Pre-Christian Education*; Mahaffy, *Old Greek Education*; Russell, *German Higher Schools*; Balfour, *Educational Systems of Great Britain and Ireland*; Quick, *Educational Reformers*; Harris, *Psychologic Foundations of Education*; Butler, *The Meaning of Education*; James, *Talks to Teachers*; Dewey, *The School and Society* and *Ethical Principles Underlying Education*; Butler, *Education in the United States*.

GEOGRAPHY

Geography (from Greek *ge*, earth, and *graphe*, description) is the description of the earth; and, more particularly, of the land, sea and air, together with the distribution of plant and animal life. It somewhat overlaps Geology, which treats of the earth's crust; and Meteorology, which treats of the atmosphere; and Biology, which treats of plant and animal life and their distribution over the earth. Geography has three main divisions: Mathematical, Physical and Political. To these, Commercial Geography is now often added, to give specific treatment to the commodities of the earth, the paths of transportation and the location of products and industries.

For general articles, see: Geography.

I. Mathematical Geography

Mathematical geography treats of the figures, measurements and motions of the earth, together with its representation by means of globes, maps and charts. See:

Earth	Longitude
Declination	Map
Globe	Meridian
International Date Line	Poles of the Heavens
Isobars	Seasons
Isotherms	Tides
Latitude	Time, Standard
	Zone

II. Physical Geography

Physical Geography deals with the natural features of the earth's surface and with their variations.

For general articles, see:

Physical Geography
Hydrography

1. LAND FORMS

See:

Antarctic Region	Mammoth Cave
Atoll	Marsh
Avalanche	Mauna Loa
Canyon	Mer de Glace
Cave	Mesa
Coastal Plain	Natural Bridge
Cordillera	Pampas
Delta	Piedmont Region
Desert	Plain
Divides	Plateau
Drift	Royal Gorge
Dune	Selvas
Earth	Steppes
Earthquake	Terrace
Etna	Tropics
Fingal's Cave	Tundra
Flood Plain	Valley
Giant's Causeway	Vesuvius
Llanos	Volcano
Luray Cavern	Wyandotte Cave

2. WATER FORMS AND ACTIVITIES

See:

Artesian Well	Lake
Atlantic Ocean	Muir Glacier
Cataract	Niagara Falls and River
Cave	Ocean
Currents, Marine	Pacific Ocean
Delta	Quicksand
Erosion	River
Estuary	Sargasso Sea
Fiord	Shoshone Falls
Geyser	Spring
Glacier	Thermal Springs
Gulf Stream	Valley
Hydrometer	Victoria Falls
Iceberg	Wave
Indian Ocean	Whirlpool
Kuro Siwo	

3. ATMOSPHERIC TOPICS

See:

Meteorology	Aurora Borealis
Anemometer	Barometer
Atmosphere	Blizzard

Calms, Regions of	Monsoon
Chinook	Northers
Climate	Prevailing
Cloud	Westerlies
Cloudburst	Rain
Cyclone	Rainbow
Dew	Rain Gauge
Fog	Saint Elmo's Fire
Frost	Simoon
Hail	Sirocco
Halo	Snow
Haze	Storm
Humidity	Thunderstorm
Hurricane	Tornado
Hydrography	Trade Winds
Indian Summer	Typhoon
Khamsein	Waterspout
Land and Sea	Weather Bureau
Breezes	Whirlwind
Lightning	Wind
Mirage	

4. OTHER TOPICS

See:

Anthropology and Ethnology (Index)
 Botany (Index)
 Zoology (Index)

III. Political, or Descriptive, Geography

Political geography describes in detail the various parts of the earth's surface, including the natural divisions into continents, and the special features which characterize these regions. It also describes the political divisions by means of which men have apportioned the earth among themselves in states and nations. It takes up, further, the activities of men, the location of the cities and structures which they have built, the distribution of the industries which they have developed, and the character of the crops which they have raised.

It will not be profitable to enumerate in the Index the list of countries, states, cities, mountains, lakes, rivers and other details of descriptive geography. These items can be more conveniently looked up in the body of the work, where they will be found arranged and described in alphabetical order.

For a few topics connected with Commercial Geography, see:

Agriculture (Index)
 Mechanic Arts (Index)
 Transportation and Communication (Index)

IV. Biographies

The story of the discovery and exploration of different portions of the earth is of thrilling interest. It is more romantic than romance itself. For the lives of some of the more noted explorers, see:

Alvarado, Pedro de
 Americus Vesputius
 Amundsen, Roald
 Andrée, S. A.
 Balboa, V. N. de
 Boone, Daniel
 Cabot, John
 Cabot, Sebastian
 Cartier, Jacques
 Champlain, Samuel de
 Columbus, Christopher
 Cook, James
 Cortez, Hernando
 De Soto, Fernando
 Du Chaillu, P. B.
 Franklin, Sir John
 Fremont, J. C.
 Frobisher, Sir Martin
 Gama, Vasco da
 Gosnold, Bartholomew
 Guyot, Arnold
 Hudson, Henry
 Humboldt, Alexander
 Kane, E. K.
 La Salle, R. R. C.
 Leif, Ericson
 Lewis, Meriwether
 Livingstone, David
 MacKenzie, Sir Alexander
 Magellan, Ferdinand
 Marquette, Jacques
 Nansen, Fridtjof
 Nordenskjöld, N. A. E.
 Park, Mungo
 Peary, R. E.
 Pizarro, Francisco
 Polo, Marco
 Ptolemy, C. P.

Ritter, Karl
 Scott, R. F.
 Stanley, Sir H. M.
 Wilkes, Charles

V. Books

The books of travel and description are too numerous to mention. They may be chosen by the reader according to his taste and purpose. The following works will be found helpful for further study:

Huxley, *Physiography*; Mill, *International Geography*; Fisher, *Physics of the Earth's Crust*; Davis, *Physical Geography*; Geikie, *Earth Sculpture*; Shaler, *Outlines of the Earth's History*; Rocheleau, *Geography of Commerce and Industry*.

GEOLOGY

Geology is the science that treats of the physical structure of the earth and the history of its development. While it draws material from other sciences, such as Astronomy, Physics, Chemistry and Biology, yet its distinctive territory is the rocky framework of the globe, known as the earth's crust. From the study of this material the story of the earth's development is unfolded.

There are various angles from which the subject may be approached, and these lead to the subdivisions of the science. One department covers the study of the materials of which the earth is formed—air, water, minerals, rocks. This is known as *Geognosy*, and is almost synonymous with what is popularly called Geology. Its chief division is *Petrology*, or the study of rocks. Another department treats of the arrangement of these materials in the earth's crust by the forces of nature. This is *Structural Geology*. The study of the forces themselves which have caused these conditions is known as *Dynamic Geology*. Still another department seeks to discover what the history of the earth has been, by interpreting this material, especially through the study of fossils and the arrangement of the earth's strata. This is called *Stratagraphical*, or *His-*

torical, Geology. A part of this, or closely related to it, is *Paleontology*, which deals more exclusively with the study of organic remains, or fossils. *Economic Geology* treats of the commercial uses of the geological material contained in the earth, such as metals, ores, precious stones and building materials.

The following outline will serve as a guide to the study of the more common phases of geology. For general articles, see:

Geology
 Geological Survey of the United States
 Paleontology

I. Minerals

Minerals are formed by chemical combinations of elements. Out of the 70 or more known elements, however, only a comparatively few enter into these combinations, oxygen being the chief ingredient, constituting 47 per cent of the earth's crust, and silicon coming next, to the extent of 28 per cent; so that these two form three-fourths of the whole. The different combinations of the elements are very many, making over 2000 mineral species; but a few of these constitute the great bulk of the earth's crust.

For general article, see:

Mineralogy

1. METALLIC MINERALS

Metals constitute about three-fourths of the known elements. They may exist either separately or in combination with other elements, in the latter case being known as ores. Nearly all of the metals and ores are valuable for commercial purposes. See:

Barium	Gold
Bauxite	Hematite
Bismuth	Iron
Cinnabar	Limonite
Cobalt	Magnetite
Copper	Manganese
Galena	Mercury

INDEX

Nickel	Stannite
Pyrites	Stibnite
Quicksilver	Strontium
(See Mercury)	Tin
Siderite	Titanium
Silver	Zinc
Spelter (See Zinc)	

2. NONMETALLIC MINERALS

For the nonmetallic minerals, see:

Asphalt	Ocher
Borax	Petroleum
Coal	Plumbago
Cryolite	(See Graphite)
Epsom Salt	Pyroxene
Glauber's Salt	Rutile
Graphite	Sal Ammoniac
Gypsum	Sulphur
Hornblende	Ultramarine
Lignite	Vitriol

II. Rocks

Rocks may be composed of one mineral exclusively, or, more commonly, of two or more minerals; or they may be of organic origin, as in the case of coal. They may be either consolidated or unconsolidated. In Geology, the various soils are also regarded as rocks.

There are many classifications of rocks, none of which is wholly satisfactory. The one here given will be found of practical value.

1. FRAGMENTAL (EXCLUSIVE OF LIMESTONES)

A large part of common rocks are only consolidated beds of sand, gravel, mud or clay. Each constituent particle was derived from earlier rocks; hence they are called *fragmental*. They are also *sedimentary* rocks, the material having been for the most part carried by waters and deposited as sediment. These rocks usually have a worn surface. See:

Clay	Marl
Grindstone	Moraine
Infusoria	(See Glacier)
Loess	Pipestone

Plaster of Paris	Sandstone
Rocking Stone	Shale
Sand	

2. CRYSTALLINE (EXCLUSIVE OF LIMESTONE)

In crystalline rocks the grains are angular instead of smooth, and they crowd upon or penetrate one another. They are generally angular, also, over a fractured surface. See:

Crystallography	Mountain Cork
Agate	Novaculite
Azurite	Obsidian
Basalt	Onyx
Chalcedony	Onyx Marble
Chrysoprase	Petrified Forests
Feldspar	Phosphate Rock
Flint	Porphyry
Geyserite	Pudding Stone
Gneiss	Quartz
Granite	Sardonyx
Iceland Spar	Serpentine
Jade	Slate
Jet	Soapstone
Kyanite	Syenite
Lapis Lazuli	Talc
Lava	Touchstone
Malachite	Trap Rock
Mica	Verd Antique
Mica Schist	

3. CALCAREOUS, OR LIMESTONE, ROCKS

Limestone rocks are commonly of fragmental origin, but may be of crystalline character. See:

Chalk	Limestone
Clay	Marble
Dolomite	Oolite
Dog Tooth Spar	Stalactite
Gypsum	Travertine
Iceland Spar	Tufa
Kaolin	

4. PRECIOUS STONES

The precious stones are crystalline rocks which have high commercial value because of their beauty or rarity. See: Precious Stones

INDEX

Agate	Diamond
Alabaster	Emerald
Amethyst	Garnet
Aquamarine	Jasper
Beryl	Opal
Bloodstone	Ruby
Cameo	Sapphire
Carbuncle	Sard
Carnelian	Sardonyx
Cat's-eye	Topaz
Chalcedony	Tourmaline
Chrysoberyl	Turquoise

III. Dynamic Geology

For articles bearing on the forces that have been at work to produce existing geological conditions, see:

Dike
Earthquake
Fault
Glacial Period
Glacier
Joints
Petrifaction (See Fossils)
Thermal Springs
Veins
Volcano

IV. Historical, or Stratigraphic, Geology

For articles bearing on the history of the earth's crust, see:

Paleontology
Archæopteryx
Carboniferous Period
Crinoids
Dinosauria
Dinotherium
Foraminifera
Fossils
Glyptodon
Ichthyosaurus
Iguanodon
Kitchen Middens
Mammoth
Mastodon
Meteor
Nummulite
Orthoceras
Pterodactyl
Trilobite

V. Books

For supplemental reading the following works may be consulted:

Dana, *Manual of Geology*; Geikie, *Text Book of Geology*; Le Conte, *Elements of Geology*; Lyell, *Principles of Geology*; Geikie, *Earth Sculpture*, and *Great Ice Age*; Kemp, *Ore Deposits of the United States and Canada*; Marr, *Scientific Study of Scenery*; Russell, *Lakes of North America*, *Rivers of North America*, *Glaciers of North America*, *Volcanoes of North America*; Shaler, *History of Our Continent*; Williams, *Geological Biology*; Zittel, *Text Book of Paleontology*.

HISTORY

In the biographies of great men we have History in the making, while History itself is the record of their noble achievements and of the development of nations. The dawn of History begins with recorded events, but previous to this there was a long period in which people were slowly developing and advancing towards the point at which History begins. This was the prehistoric age. For convenience in this outline we will follow the natural division into three periods, Ancient, Medieval and Modern. The period from the dawn of History to the fall of Rome will be included in the Ancient division; the period through the Renaissance and the discovery of America, in the Medieval; and from that time to the present day, in the Modern.

A Compendium of the History of the World by C. E. Patzer is given under the heading History, which gives a clear, concise outline from 2500 B. C. down to the 20th century.

For general articles, see:

History
Africa, subhead History
Archæology
Asia, subhead History
Australia, Commonwealth of
Chronology
Europe, subhead History
Fifteen Decisive Battles

INDEX

North America, subhead History
 South America, subhead History
 Stone Age

I. Ancient Period

In the darkness which hides the earliest deeds of man, light dawns first in Babylonia and Assyria. Much of this history is recorded in the Index, Department of Religion and Theology. Greek and Roman history developed rapidly, the earlier part of which is veiled in mythology, which will be found in the Index, Department of Mythology. Grecian art and the empire of the Cæsars are the high-lights of this Ancient Period. The history of each country will be found under the subhead *History* in the article describing that country. For other topics, see:

1. ORIENTAL NATIONS

Abydos	Karnak, The
Arabs	Temple of
Arbela, Battle of	Luxor, The Temple
Artaxerxes	of
Attila	Lydia
Babylon	Media
Carthage	Memphis
Chaldea	Nebuchadnezzar
Cleopatra	Oriental Art
Cuneiform	Persepolis
Inscriptions	Phœnicia
Cræsus	Pyramids
Cyrus the Great	Rameses II
Darius Hystaspes	Rosetta Stone
Darius III	Sargon II
Hamites	Seleucidæ
Heliopolis	Sennacherib
Herod	Seven Wonders of
Hieroglyphics	the World
Israel, Kingdom of	Thebes
Issus, Battle of	Xerxes

2. GREECE

See:	
Achæans	Amphictyonic
Ægospotami	Council
Alexander the Great	Architecture,
	subhead Greece

Areopagus	Pericles
Aristides	Philip II
Athens	Piræus
Dorians	Pisistratus
Draco	Salamis, Battle of
Education, subhead	Slavery, subhead
Greece	Greece and Rome
Epaminondas	Solon
Greece	Sparta
Ionians	Thebes
Lycurgus	Themistocles
Macedonia	Thermopylæ;
Marathon, Battle of	Battle of
Miltiades	Thirty Tyrants
Pelopidas	Thrace
Peloponnesus	

3. ROME

See:

Alba Longa	Helvetii
Actium	Julian
Alaric I	Marius, Caius
Appian Way	Mark Antony
Architecture,	Mithridates the
subhead Rome	Great
Augustus	Nero
Baths, Roman	Pompey
Byzantine Empire	Prætor
Cæsar, C. J.	Prætorian Guard
Campus Martius	Punic Wars
Carthage	Quæstor
Catiline	Rome, Ancient
Censors	Romulus
Cicero, M. T.	Sabines
Colosseum	Sculpture, subhead
Constantine the	Rome
Great	Slavery, subhead
Crassus, M. L.	Greece and Rome
Curule Magistrates	S. P. Q. R.
Dictator	Stilicho, Flavius
Education, subhead	Sulla, L. C.
Rome	Tarpeian Rock
Etruria	Tarquin
Fabius	Theodosius
Forum	Tiberius
Franks	Titus
Gaul	Trajan
Goths	Tribune
Gracchus, Caius	Triumph
Gracchus, Tiberius	Vandals
Hannibal	

II. Medieval Period

For 1000 years after the fall of Rome the Byzantine Empire continued to exist, and in the Western Empire the Germanic tribes settled as masters. The modern peoples of Europe date from this time. Under Charlemagne the Franks obtained the most powerful position among the barbarian kingdoms, and the alliance with the pope was made which established the connection between the empire and Church. Upon the death of Charlemagne the two great kingdoms of Germany and France arose from his divided kingdom. Nations grew up rapidly, and from the relations of conqueror and conquered grew the system of feudalism. The Crusades marked the entrance of a new spirit into the age, which resulted in the gradual breaking of the Medieval Period. The commerce of western Europe increased, and the rise of a powerful burgher class aided the kings in throwing off the yoke of the feudal nobility. Contact with the East; numerous astronomical discoveries and the invention of the printing press and gunpowder stimulated the minds of the Middle Ages and were potent factors in the Renaissance.

For general articles, see:

Middle Ages, The	Feudal System
Crusades	Pope
Dark Ages	Renaissance

1. HISTORY (476-1492)

See:

Acre
 Agincourt, Battle of
 Alfred the Great
 Anglo-Saxon
 Anglo-Saxon Chronicle
 Army, subhead
 Medieval Armies
 Basel, Council of
 Becket, Thomas
 Belisarius
 Borgia
 Bruce, Robert
 Burgundy
 Byzantine Empire

Canute
 Capetian Dynasty
 Carolingians
 Charlemagne
 Charles Martel
 Chivalry
 Clovis
 Crécy, Battle of
 Education, subheads Charlemagne, Scholasticism
 Edward I
 Edward III
 England, subhead History
 France, subhead History
 Frederick II
 Germany, subhead History
 Guelphs and Ghibellines
 Hastings, Battle of
 Henry IV (Holy Roman Empire)
 Heraldry
 Hohenstaufen
 Holy Roman Empire
 Hundred Years' War
 Iconoclasts
 Isabella I
 Italy, subhead History
 Joan of Arc
 John of Gaunt
 Justinian
 Lancaster, House of
 Lombards
 Magna Charta
 Margaret
 Margaret of Anjou
 Medici
 Mohammedanism
 Mongols
 Moors
 Normandy
 Normans
 Philip Augustus
 Portugal, subhead History
 Richard I
 Richard II
 Richard III
 Roses, Wars of the
 Saracens
 Savonarola, Girolamo
 Scotland, subhead History
 Seljuks
 Spain, subhead History
 Templars, Knights
 Teutonic Race

Theodoric
Tours, Battle of
Truce of God
Urban
Vikings
Werewolf
William I
Witenagemot
York, House of

III. Modern Period

The Modern Period opened with the European peoples on the eve of a great religious revolution. State formation had resulted in the establishment of strongly centralized nations in England, France and Spain, but Germany and Italy remained disunited until the 19th century. Up to the Peace of Westphalia in 1648 the religious strife kept all Europe in a turmoil, but after this a balance of power was established among the European states, which, although disturbed by Louis XIV of France, was generally maintained. The burgher class rose to prominence and power, holding sway until the French Revolution, when the spirit of intellectual revival and religious reform made the French people revolt against the abuses and extravagances of the Bourbon monarchy, while the poorer classes were in such wretched condition. The Church lost authority over the temporal affairs of its members and was subordinate to the State. Science, commerce and colonization broadened the scope of all nations and aided modern development. The International Peace Conference at The Hague in 1899 and again in 1907 showed how far the world had advanced, when 44 nations sent representatives to establish laws by which all nations could harmoniously work together and settle their difficulties at the Court of Arbitration. Much of the history can be better understood by taking each country separately; hence this outline takes up Great Britain, France, Germany, Russia and the Oriental nations separately, and groups all the rest under a general heading. The United States is treated separately and in more detail.

1. GREAT BRITAIN

See:

England, subhead History
Great Britain, subhead History
Scotland, subhead History
Anne
Asquith, H. H.
Charles I
Charles II
Crimean War
Cromwell, Oliver
East India Company
Edward VII
Elizabeth
Flodden Field
George
George I
George V
Gladstone, W. E.
Gunpowder Plot
Henry VIII
Hessians
Holyrood
Home Rule
James I
James II
London Company
Long Parliament
Mary I
Mary Stuart
Naseby, Battle of
Navigation Acts
Nelson, Horatio
Petition of Right
Pitt, William
Quebec Act
Roundheads
Rye House Plot
Sepoy
South African War
South Sea Company
Spanish Armada, The
Star Chamber
Stuart, House of
Townshend Acts
Trafalgar
Tudor, House of
Victoria
Wales, Prince of
Wellington, Duke of
William III

INDEX

2. FRANCE

See:

Austerlitz, Battle of
Bastille
Bourbon
Calvin, John
Commune of Paris
Directory
Emigrés
Field of the Cloth of Gold
Francis I
Franco-German War
French Revolution
Girondists
Guise
Huguenots
Jacobins
Louis XIV
Louis XV
Louis XVI
Louis Philippe
Marengo, Battle of
Marie Antoinette
Marie Louise
Marseillaise, The
Nantes, Edict of
Napoleon I
Napoleon III
National Guard
Orleans
Ryswick, Peace of
Spanish Succession, War of the
States-General
Swiss Guards
Utrecht, Treaty of
Waterloo, Battle of

3. GERMANY

See:

Bismarck-Schönhausen
Franco-German War
Maria Theresa
Palatinate
Prussia
Seven Years' War
Thirty Years' War
Utrecht, Treaty of
Westphalia, Peace of
William II
Zollverein

4. RUSSIA

See:

Catherine II
Crimean War
Duma
Holy Alliance
Nicholas I
Nicholas II
Peter the Great
Russo-Japanese War
Russo-Turkish War
Sebastopol, Siege of

5. ORIENTAL

See:

Durbar
Korea, subhead People, History, Government
Mukden
Mutsuhito
Oyama, Iwao
Port Arthur
Portsmouth, N. H.
Russo-Japanese War
Solyman II
Sun Yat-Sen
Togo, Heihachiro
Yuan Shih-Kai

6. GENERAL

See:

Aix-la-Chapelle, Treaties of
Austria-Hungary, subhead History
Austrian Succession, War of the
Balkan War
Barbary States, Wars with
Berlin, Congress of
Brazil, subhead History
Cavour
Charles V
Charles XII
Christina
Crimean War
Ferdinand
Ferdinand V of Castile
Fifteen Decisive Battles
Fontenoy, Battle of
Francis II
Garibaldi, G.
Gustavus I

INDEX

Hague, The
 Hapsburg, House of
 Holy Roman Empire
 Leopold II
 Maximilian I
 Paris, Treaties of
 Peace Conference, International
 Peter I
 Philip II
 Poland
 Quebec, Battle of
 Reformation, The
 Ryswick, Peace of
 Sadowa, Battle of
 Sardinia, Kingdom of
 Savoy, House of
 Seven Weeks' War
 Seven Years' War
 Sicilies, Kingdom of the Two
 Spanish Armada, The
 Spanish Succession, War of the
 Swiss Guards
 Triple Alliance
 Utrecht, Treaty of
 Vatican
 Vatican Council
 Victor Emmanuel II
 Victor Emmanuel III
 Vienna, Congress of
 Wilhelmina, Queen

7. UNITED STATES

For the period from the discovery of America to the founding of Jamestown, see the following biographies:

Americus Vesputius
 Balboa, Vasco de
 Cabot, John
 Cabot, Sebastian
 Cartier, Jacques
 Champlain, Samuel de
 Columbus, Christopher
 Cortez, Hernando
 De Soto, Fernando
 Drake, Sir Francis
 Gosnold, Bartholomew
 Hennepin, Louis
 Hudson, Henry
 La Salle, René
 Magellan, Ferdinand
 Marquette, Jacques
 Menendez de Aviles

Narvaez, Pánfilo de
 Ponce de Leon
 Raleigh, Sir Walter
 Verrazano, Giovanni da
 For general articles, see:
 United States, subhead History
 Political Parties in the United States

A. Colonial Period

See:

Albany Conventions
 Bacon's Rebellion
 Boston Massacre
 Boston Port Bill
 Boston Tea Party
 Charter Oak
 Committees of Correspondence
 Congress, Continental
 Connecticut, Fundamental Orders of
 Faneuil Hall
 Federal Hall
 Fort Duquesne
 Fort Edward
 Fort Necessity, Attack on
 Fort Niagara
 Fort Stanwix
 Fort William Henry
 French and Indian Wars
 Gaspee, Affair of the
 Independence Hall
 Jamestown, Va.
 Liberty Bell
 London Company
 Louisburg, Sieges of
 Mason and Dixon's Line
 Massachusetts Bay Colony
 Mayflower Compact
 New England Confederation
 New England, Council for
 Non-Importation Agreement
 Parson's Cause
 Pequot War
 Pilgrims
 Plymouth Colony
 Plymouth Company
 Providence Plantations
 Puritans
 Roanoke Colony
 Stamp Act
 Stamp Act Congress
 Witchcraft
 Writs of Assistance

B. The Revolution

See:

Revolutionary War in America
 Bennington, Battle of
 Bon Homme Richard
 Brandywine, Battle of the
 Bunker Hill, Battle of
 Camden, Battles of
 Cherry Valley Massacre
 Confederation, Articles of
 Continental Money
 Conway Cabal
 Cowpens, Battle of the
 Declaration of Independence
 Dorchester Heights
 Eutaw Springs, Battle of
 Fort Griswold, Massacre of
 Fort Moultrie
 Germantown, Battle of
 Guilford, Battle of
 King's Mountain, Battle of
 Lexington, Battle of
 Long Island, Battle of
 Minutemen
 Monmouth, Battle of
 Princeton, Battle of
 Saratoga, Battles of
 Stony Point
 Ticonderoga
 Trenton, Battle of
 Valley Forge
 Washington, George
 Washington Elm
 White Plains, Battle of
 Yorktown, Sieges of

C. First National Period

See:

Alien and Sedition Laws
 Annapolis Convention
 Buena Vista, Battle of
 Bunker Hill Monument
 Cerro Gordo, Battle of
 Chapultepec, Battle of
 Chesapeake and Leopard, Affair of the
 Clayton-Bulwer Treaty
 Compromise of 1850
 Constitution of the United States
 Constitution, The
 Dred Scott Case
 Embargo Act

Era of Good Feeling
 Erie, Battle of Lake
 Fifty-four Forty or Fight
 Fort Dearborn
 Fort Mims, Massacre of
 Gadsden Treaty
 Ghent, Treaty of
 Guadalupe Hidalgo, Treaty of
 Hard Cider Campaign
 Hartford Convention
 Lewis and Clark Expedition
 Louisiana Purchase
 Lundy's Lane, Battle of
 Mexican War
 Milan Decree
 Missouri Compromise
 Monroe Doctrine
 New Orleans, Battle of
 Northwest Territory
 Non-Intercourse Act
 Nullification
 Ordinance of 1787
 Plattsburg, Battle of
 President and Little Belt, Affair of the
 Queenstown Heights, Battle of
 River Raisin, Battle of the
 Shannon and Chesapeake, Battle of the
 Shays's Rebellion
 Tippecanoe, Battle of
 War of 1812
 Webster-Ashburton Treaty
 Whiskey Insurrection
 White House, The
 X Y Z Papers

D. Civil War

See:

Civil War in America
 Andersonville, Ga.
 Antietam, Battle of
 Ball's Bluff, Battle of
 Bull Run, Battles of
 Chancellorsville, Battle of
 Chattanooga, Battle of
 Chickamauga, Battle of
 Cold Harbor, Battles of
 Confederate States of America
 Corinth, Miss.
 Emancipation, Proclamation of
 Fair Oaks, Battle of
 Five Forks, Battle of
 Fort Henry

INDEX

Fort Sumter
Fredericksburg, Battle of
Gettysburg, Battle of
Hampton Roads, Battle of
Hampton Roads Conference
Harper's Ferry, W. Va.
Island Number 10
Kenesaw Mountain, Battle of
Libby Prison
Lincoln, Abraham
Lookout Mountain, Battle of
Malvern Hill, Battle of
Mechanicsville, Battle of
Mill Springs, Battle of
Mobile Bay, Battle of
Monitor, The
Murfreesboro, Battle of
Nashville, Battle of
North Anna River, Battle of
Peninsula Campaign
Petersburg, Siege of
Port Gibson, Battle of
Port Hudson, Siege of
Roanoke Island
Savannah, Capture of
Shiloh, Battle of
South Mountain, Battle of
Spottsylvania Courthouse, Battle of
Trent Affair
Vicksburg Campaign
Wilderness, Battle of the
Williamsburg, Battle of
Wilson's Creek, Battle of

E. Period since the Civil War

See:

Alabama Claims
Bering Sea Controversy
Bull Moose
Carpetbaggers
Centennial Exposition
El Caney, Battle of
Fisheries Question
Hall of Fame
Hay-Pauncefote Treaty
Maine, The
Manila Bay, Battle of
Open-Door Policy
Oregon, The
Panama Canal
Reconstruction
Rough Riders
San Juan, Battle of

Santiago, Battle of
Spanish-American War
Specie Payments, Resumption of
Titanic, The
Washington, Treaty of
World's Columbian Exposition

IV. Books

The following books will be found useful in a more extended study of History:

Brinton, *The American Race*; Keary, *The Dawn of History*; Lang, *Custom and Myth*; Hosmer, *The Jews*; Maspero, *Life in Ancient Egypt and Assyria*; Sayce, *Babylonians and Assyrians*; West, *Ancient World*; Abbott, *Pericles*; Bury, *History of Greece*; Fowler, *The City State of the Greeks and Romans*; Sheppard, *The Fall of Rome*; Thomas, *Roman Life under the Cæsars*; Bryce, *The Holy Roman Empire*; Church, *Beginning of the Middle Ages*; Hassall, *The Balance of Power*; Fisher, *History of the Reformation*; Goodyear, *Renaissance and Modern Art*; Guizot, *History of Civilization in Europe*; Myers, *Ancient History, and Medieval and Modern History*; James and Sanford, *American History*; Bancroft, *History of the United States*.

HORTICULTURE AND FORESTRY

Horticulture and Forestry are closely related to Agriculture, and are usually carried on to a greater or less extent in connection with the ordinary farm. Often, however, they constitute specific and separate industries. See Index, Department of Agriculture.

I. In General

Various articles give information concerning general topics connected with horticulture and forestry. See:

Canning	Grafting
Conservation	Greenhouse
Flower	Nursery
Forestry	Phylloxera
Gardening	Pruning

II. Horticulture

Horticulture deals with the raising of fruit, vegetables and flowers. In general terms, it may be said that, while Agriculture deals with the crop as a whole, Horticulture pays more attention to the individual plant and product. Great advances have been made in Horticulture in recent years by the more careful study of the cultivation and the crossbreeding of plants. In this way new varieties have been produced and new uses discovered.

1. FRUIT TREES AND FRUITS

Many species of trees, shrubs and vines produce either juicy fruits or nuts which are edible; and many of these are cultivated for the purpose of improving their quality. Fruit raising has therefore become one of the most important parts of Horticulture. See:

Alligator Pear	Hazel
Almond	Hickory
Apple	Huckleberry
Apricot	June Berry
Banana	Kumquat
Beech	Lemon
Betel	Lime
Blackberry	Loquat
Brazil Nut	Mango
Breadfruit	Mulberry
Butternut	Nectarine
Cherry	Nut
Chestnut	Olive
Citron	Orange
Citrus	Papaw
Coconut	Peach
Crab Apple	Pear
Cranberry	Pecan
Currant	Persimmon
Date	Pineapple
Dewberry	Plum
Earthnut	Pomegranate
Fig	Prune
Fruit	Quince
Gooseberry	Raspberry
Grape	Sloe
Grapefruit	Strawberry
Guava	Tamarind

2. VEGETABLES

The distinction between crops and vegetables is not clearly marked. In general, the former are raised in the field, and the latter in the garden. See:

Artichoke	Lettuce
Asparagus	Muskmelon
Beet	Onion
Cabbage	Parsnip
Carrot	Peanut
Cauliflower	Pumpkin
Celery	Radish
Chicory	Rhubarb
Citron	Rice
Corn	Salsify
Cress	Spinach
Cucumber	Squash
Eggplant	Tomato
Gourd	Turnip
Horseradish	Vetch
Leek	Watermelon
Lentil	Yam

III. Forestry

Forestry is the science and art that deals with the management of growing timber in forests. It is distinct from Arboriculture, which is more strictly concerned with individual trees. The wood of many species of trees is used for lumber, and is an important article of commerce. Fruit trees will be found in a separate list. See:

Trees	Cucumber Tree
Acacia	Cycads
Ash	Cypress
Aspen	Dogwood
Banyan	Douglas Fir
Baobab	Doum Palm
Basswood	Ebony
Beech	Elm
Birch	Eucalyptus
Bottle Tree	Fir
Box Elder	Hemlock
Buckeye	Hickory
Calamander Wood	Honey Locust
Catalpa	Hornbeam
Cedar	Horse-Chestnut
Cherry Laurel	Ironwood
Conifer	Ivory Palm
Coral Tree	Lacebark Tree
Cow Tree	

Lambert's Pine	Rubber
Larch	Sandalwood
Lignum Vitæ	Screw Pine
Locust	Sequoia
Magnolia	Spruce
Mahogany	Sycamore
Mangrove	Talipot
Maple	Tallow Tree
Mountain Ash	Teak
Myrtle	Traveler's Tree
Oak	Tulip Tree
Palm	Upas
Palmetto	Walnut
Pine	Wax Myrtle
Poplar	Wax Palm
Quebracho	Willow
Redwood	Yew

IV. Horticultural and Forestry Products

Some of the important products of Horticulture and Forestry, including fiber plants, medicinal plants, spices, perfumes and gums, will be found in the Index, Department of Botany, subhead Economic Botany. For others, see:

Chicory	Pitch
Cider	Raisins
Cocoa	Tar
Coffee	Tea
Cola	Turpentine
Gutta-Percha	Vinegar
Lumber	Wine
Mahogany	

V. Books

For further reading, the following books will be found helpful:

Mortimer, *The Whole Art of Husbandry*; King, *Irrigation and Drainage*; Bailey, *Principles of Fruit Growing*, and *Principles of Vegetable Growing*; Bailey and Miller, *Cyclopedia of American Horticulture*; Fuller, *The Small Fruit Culturist*; Henderson, *Practical Floriculture*.

Many good journals are also available.

LANGUAGE AND LITERATURE

The need of conveying ideas from one mind to other minds gave rise to symbols of thought, or Language. At first such symbols may have been very crude,

a certain sound or gesture being used to represent a given idea; or, in written language, a picture or mark, as the Egyptian hieroglyphics. In highly developed languages, ideas are represented by means of words, the names of objects being joined by various parts of speech so as to make possible the expression of a connected course of thought. When set forth and expressed in writing, this constitutes Literature.

LANGUAGE

The general article on Language takes the subject up fully, including an account of Philology and the more important national languages. See:

Language
Abbreviations
Address, Forms of
Alphabet
Cuneiform Inscriptions
Dictionary
Esperanto
Grammar
Hieroglyphics
Phonetics
Punctuation
Rhetoric
Runes
Semitic Languages
Spelling

LITERATURE

Literature, in its broadest sense, includes all written records of thought. The term is generally used in a more restricted sense, however, to designate writings worthy of preservation, distinguished by artistic form or emotional appeal.

The two main divisions of Literature are Poetry and Prose; and these are subdivided into their respective classes. Science and Philosophy are not included in this outline on Literature, but will be found under separate headings in the Index. For the names of men prominent in those departments, see Index, heading Biography, subheads Scientists, Philosophers.

INDEX

The discussion of the various national literatures will be found in the general article, Literature.

I. Poetry

Poetry is the representation of human experiences in rhythmical, artistic language, appealing, in general, to the emotions by means of the imagination. Poetry may be divided into three main groups, Epic, Lyric and Dramatic.

For general article, see:

Poetry

1. EPIC POETRY

Epic Poetry in its broadest application embraces all poetry that is essentially narrative in character; and it is so understood here. For the various forms of Epic Poetry, see subhead Epic Poetry in the general article Poetry. See:

Ariosto, Lodovico
Arnold, Sir Edwin
Barlow, Joel
Braga, Theophilo
Browning, Robert
Byron, G. N. G.
Cædmon
Camoens, Luis Vaz de
Chaucer, Geoffrey
Crabbe, George
Dante, Alighieri
Ennius, Quintus
Firdousi
Goethe, J. W. von
Homer
Klopstock, F. G.
Longfellow, H. W.
Lytton, E. R. B. (Owen Meredith)
Macpherson, James
Masefield, John
Milton, John
Noyes, Alfred
Pope, Alexander
Runeberg, Johan
Scott, Sir Walter
Spenser, Edmund
Tasso, Torquato
Tegnér, Esaiás
Vergil
Whittier, J. G.
Wieland, C. M.

2. LYRIC POETRY

Lyric Poetry expresses the personal emotions of the poet, or of those whom he represents. The various forms of Lyric Poetry are discussed under the subhead Lyric Poetry in the article Poetry. See:

Abt, Franz
Aldrich, T. B.
Anacreon
Arndt, E. M.
Austin, Alfred
Béranger, P. J. de
Blake, William
Browning, E. B.
Browning, Robert
Bryant, W. C.
Burns, Robert
Byron, G. N. G.
Camoens, Luis Vaz de
Campbell, Thomas
Campbell, W. W.
Carleton, Will
Carman, Bliss
Cary, Alice and Phœbe
Catullus, C. V.
Chatterton, Thomas
Coleridge, S. T.
Collins, William
Cowley, Abraham
Cowper, William
Crosby, Frances J.
Drake, J. R.
Dryden, John
Dunbar, P. L.
Field, Eugene
Finch, F. M.
Foster, S. C.
Fréchette, L. H.
Freneau, Philip
Gilder, R. W.
Goethe, J. W. von
Gray, Thomas
Halleck, Fitz-Greene
Heber, Reginald
Heine, Heinrich
Hemans, F. D.
Herbert, George
Herrick, Robert
Holmes, O. W.
Hood, Thomas
Horace

INDEX

Howe, Julia W.
 Ingelow, Jean
 Jackson, H. F. H.
 Johnson, Emily P.
 Jonson, Ben
 Keats, John
 Keble, John
 Key, F. S.
 Lampman, Archibald
 Landor, W. S.
 Lang, Andrew
 Lanier, Sidney
 Larcom, Lucy
 Longfellow, H. W.
 Lowell, J. R.
 Lucretius
 Markham, Edwin
 Miller, C. H. (Joaquin Miller)
 Moore, Thomas
 Moulton, E. L.
 Musset, Alfred de
 O'Reilly, J. B.
 Ovid
 Petrarch, Francesco
 Pindar
 Poe, E. A.
 Procter, A. A.
 Procter, B. W.
 Read, T. B.
 Riley, J. W.
 Roberts, C. G. D.
 Rossetti, C. G.
 Rossetti, D. G.
 Sachs, Hans
 Sappho
 Saxe, J. G.
 Scott, D. C.
 Service, R. W.
 Shakespeare, William
 Shelley, P. B.
 Sigourney, Lydia
 Simonides
 Smith, S. F.
 Southey, Robert
 Spenser, Edmund
 Surrey, Earl of
 Swinburne, A. C.
 Taylor, Bayard
 Tennyson, Alfred
 Theocritus
 Thomson, James
 Uhland, J. L.
 Van Dyke, Henry

Waller, Edmund
 Walthen von der Vogelweide
 Whitman, Walt
 Whittier, J. G.
 Wilcox, Ella W.
 Wordsworth, William
 Wyatt, Sir Thomas
 Young, Edward

3. DRAMATIC POETRY

Dramatic Poetry is both narrative and lyrical in nature, for it presents the story of human experiences from the standpoint of the feelings of the characters. For further discussion of the subject and the list of dramatic poets, see subhead Drama below.

II. Drama

A drama is a literary work in which events and characters are presented by means of conversation and action. It is usually designed to be performed by actors in the presence of an audience. The typical drama, whether written in prose or poetry, is divided into acts, and the acts into scenes. For the description and history of this form of Literature, see general article Drama and subhead Dramatic Poetry in the article Poetry. See:

Æschylus
 Alfieri, Vittorio
 Annunzio, Gabriele d'
 Aristophanes
 Barrie, J. M.
 Beaumarchais
 Beaumont and Fletcher
 Björnson, Björnsterne
 Browning, Robert
 Calderon de la Barca, Pedro
 Congreve, William
 Corneille, Pierre
 Dryden, John
 Dumas, Alexandre (Elder)
 Dumas, Alexandre (Younger)
 Euripides
 Galsworthy, John
 Gay, John
 Gilbert, Sir W. S.
 Goethe, J. W. von
 Gregory, Lady Isabella

Halévy, Ludovic
 Hauptmann, Gerhart
 Hugo, V. M.
 Ibsen, Henrik
 Jones, H. A.
 Jonson, Ben
 Knowles, J. S.
 Lessing, G. E.
 Maeterlinck, Maurice
 Marlowe, Christopher
 Molière, J. B. P.
 Phillips, Stephen
 Pinero, Sir A. W.
 Plautus, T. M.
 Racine, Jean
 Sackville, Thomas
 Sardou, Victorien
 Schiller, J. C. F. von
 Shakespeare, William
 Shaw, G. B.
 Sheridan, R. B.
 Sophocles
 Sudermann, Hermann
 Synge, J. M.
 Terence
 Udall, Nicholas
 Vega, Carpio, F. L. de
 Voltaire
 Wilde, O. W.
 Yeats, W. B.

III. Prose

1. FICTION

Of the several divisions of prose Literature, Fiction is probably the most widely read. Fiction is that form of Literature which treats of imaginary events, situations and characters. Prominent types of Fiction are the Novel, the Fable, the Parable, the Allegory and the Fairy Tale. See the general article Fiction and appropriate subheads. See:

Abbott, Jacob
 Adams, W. T. (Oliver Optic)
 Æsop
 Ainsworth, W. H.
 Alcott, L. M.
 Alden, I. M. (Pansy)
 Aldrich, T. B.
 Alger, Horatio
 Allen, J. L.
 Andersen, H. C.

Annunzio, Gabriele d'
 Asbjørnsen, P. C.
 Auerbach, Berthold
 Austen, Jane
 Bacheller, A. I.
 Bacon, Josephine D. D.
 Balzac, Honore de
 Bangs, J. K.
 Barr, Amelia E. H.
 Barr, Robert
 Barrie, J. M.
 Bennett, E. Arnold
 Besant, Sir Walter
 Björnson, Björnstjerne
 Black, William
 Blackmore, R. D.
 Boccaccio, Giovanni
 Boyesen, H. H.
 Brady, C. T.
 Bremer, Fredrika
 Brontë, Charlotte
 Brown, C. B.
 Brown, John
 Bulwer-Lytton, E. G. E.
 Bunyan, John
 Butterworth, Hezekiah
 Cable, G. W.
 Caine, T. H. H.
 Catherwood, M. H.
 Cervantes Saavedra, Miguel de
 Churchill, Winston
 Clark, C. H. (Max Adeler)
 Clemens, S. L. (Mark Twain)
 Collins, W. W.
 Cooke, J. E.
 Cooper, J. F.
 Corelli, Marie
 Craik, D. M.
 Crawford, F. M.
 Dana, R. H., Jr.
 Daudet, Alphonse
 Davis, R. B. H.
 Davis, R. H.
 Defoe, Daniel
 Deland, M. W. C.
 De Mille, James
 De Morgan, W. F.
 Dickens, C. J. H.
 Dixon, Thomas
 Dodge, M. E. M.
 Dodgson, C. L. (Lewis Carroll)
 Doyle, Sir A. C.
 Dumas, Alexandre (Elder)

INDEX

- Ebers, G. M.
 Edgeworth, Maria
 Edwards, A. B.
 Eggleston, Edward
 Eggleston, G. C.
 Eliot, George
 Fielding, Henry
 Fogazzaro, Antonic
 Ford, P. L.
 Fouqué, F. H. K.
 Fox, John, Jr.
 Freeman, M. E. W.
 French, Alice (Octave Thanet)
 Garland, Hamlin
 Gaskell, Elizabeth C.
 Goethe, J. W. von
 Goldsmith, Oliver
 Gordon, C. W. (Ralph Connor)
 Gorky, Maxim
 Grant, Robert
 Grimm Brothers
 Haggard, Sir H. R.
 Hardy, Thomas
 Harris, J. C. (Uncle Remus)
 Harrison, C. C.
 Harte, F. B.
 Hawkins, A. H.
 Hawthorne, Julian
 Hawthorne, Nathaniel
 Henty, G. A.
 Herrick, Robert
 Hewlett, M. H.
 Holland, J. G.
 Hough, Emerson
 Howells, W. D.
 Hughes, Thomas
 Hugo, V. M.
 Jackson, H. F. H.
 James, Henry
 Jerome, J. K.
 Jewett, S. O.
 Johnston, Mary
 Kingsley, Charles
 Kipling, J. Rudyard
 Lagerlöf, Selma
 Le Sage, A. R.
 Lever, C. J.
 London, Jack
 Lover, Samuel
 Lucas, E. V.
 McCarthy, Justin
 McCutcheon, G. B.
 Macdonald, George
 Malory, Sir Thomas
 Marryat, Frederick
 Maupassant, Guy de
 Meredith, George
 Merrick, Leonard
 Mitchell, S. W.
 Mitford, Mary R.
 More, Hannah
 Munroe, Kirk
 Murfree, Mary N. (Charles E. Crad-
 dock)
 Musset, Alfred de
 Norris, Frank
 Oliphant, Margaret
 Page, T. N.
 Parker, Sir Gilbert
 Parrish, Randall
 Paulding, J. K.
 Perrault, Charles
 Pidgin, C. F.
 Poe, E. A.
 Porter, Jane
 Porter, Sydney (O. Henry)
 Ramée Louise de la (Ouida)
 Read, O. P.
 Reade, Charles
 Reid, Mayne
 Rice, Alice H.
 Richardson, Samuel
 Riggs, Kate D. W.
 Rives, Amélie
 Roe, E. P.
 Rohlf, Anna K. G.
 Saint-Pierre, J. H. B. de
 Sand, George
 Scott, Sir Walter
 Scudder, H. E.
 Sienkiewicz
 Simms, W. G.
 Smith, F. H.
 Smollett, T. G.
 Sterne, Laurence
 Stevenson, R. L.
 Stockton, F. R.
 Stowe, H. B.
 Stuart, Ruth M.
 Sudermann, Hermann
 Sue, Eugène
 Tarkington, Booth
 Terhune, Mary V. (Marion Harland)
 Thackeray, W. M.
 Thompson, J. M.
 Tieck, J. L.

INDEX

Tolstoy, Leo
 Trollope, Anthony
 Trowbridge, J. T.
 Turgeniev, Ivan
 Verne, Jules
 Voltaire
 Walpole, Horace
 Ward, Elizabeth S. P.
 Ward, Mary A. (Mrs. Humphry)
 Warman, Cy
 Watson, H. B. M.
 Watson, John (Ian Maclaren)
 Wells, H. G.
 Wharton, Edith
 White, S. E.
 Whitney, Adeline D.
 Wilson, Augusta Evans
 Wilson, John (Christopher North)
 Wister, Owen
 Wright, H. B.
 Wyss, J. R.
 Zangwill, Israel
 Zola, E. E.

2. HISTORY

History is the record of human life on the earth. In order to understand the present we must know something of the past in which it strikes its roots. Two marked tendencies characterize modern history writing. The first is its scientific character. The same spirit that animates the study of natural science, in its effort to get at the real facts concerning the universe, inspires the historian to discover and reproduce the actual conditions of the past. The second tendency is the transfer of emphasis from kings and wars, which formerly occupied so large a place, to the consideration of the life of the great masses of the common people, the development of thought and the growth of institutions. See:

Abbott, J. S. C.
 Adams, C. F., Jr.
 Adams, C. K.
 Adams, Henry
 Adams, H. B.
 Bancroft, George
 Bancroft, H. H.
 Bede
 Bourinot, Sir J. G.

Curtius, Ernst
 Eusebius, Pamphili
 Ferrero, Guglielmo
 Fiske, John
 Freeman, E. A.
 Froissart, Jean
 Froude, J. A.
 Gardiner, S. R.
 Geoffrey of Monmouth.
 Gibbon, Edward
 Grote, George
 Guizot, F. P. G.
 Hallam, Henry
 Hart, A. B.
 Herodotus
 Hume, David
 Josephus, Flavius
 Lamartine, A. M. L.
 Lecky, W. E. H.
 Livy
 Lossing, B. J.
 McCarthy, Justin
 McMaster, J. B.
 Michelet, Jules
 Mommsen, Theodor
 Motley, J. L.
 Niebuhr, B. G.
 Parkman, Francis
 Polybius
 Prescott, W. H.
 Ranke, Leopold von
 Rawlinson, George
 Rhodes, J. F.
 Ridpath, J. C.
 Sallust
 Schoolcraft, H. R.
 Smith, Goldwin
 Smith, John
 Tacitus, P. C.
 Thucydides
 Thwaites, R. G.
 Voltaire
 Wilson, Woodrow
 Xenophon

3. ESSAYS

The Essay is a literary composition written for the purpose of analysis, interpretation or other expression of truth, the writer dealing with the subject in a more or less personal way. It is less formal than a treatise or thesis, and is

INDEX

more restricted in scope than History or Biography. See:

Addison, Joseph
 Arnold, Matthew
 Ascham, Roger
 Bates, Arlo
 Burroughs, John
 Carlyle, Thomas
 Curtis, G. W.
 De Quincey, Thomas
 Emerson, R. W.
 Fields, J. T.
 Fuller, Sarah M.
 Goldsmith, Oliver
 Hazlitt, William
 Herder, J. G. von
 Holland, J. G.
 Holmes, O. W.
 Hunt, Leigh
 Irving, Washington
 Johnson, Samuel
 Lamb, Charles
 Lowell, J. R.
 Mabie, H. W.
 Macaulay, T. B.
 Milton, John
 Ruskin, John
 Smiles, Samuel
 Steele, Sir Richard
 Stevenson, R. L.
 Thoreau, H. D.
 Van Dyke, Henry
 Warner, C. D.

4. JOURNALISM

Journalism includes the collection and publication of current news through the press, and the business of managing, editing or writing for journals or periodicals. Much attention is being given to this subject at the present time, and schools of journalism are being established in several of the universities. For journalists, see:

Abbott, Lyman	Dodge, M. E. M.
Bennett, J. G.	Dunne, F. P.
Bennett, J. G., Jr.	Eggleston, G. C.
Bigelow, John	Field, Eugene
Bryant, W. C.	Garrison, W. L.
Curtis, G. W.	Gilder, R. W.
Curtis, W. E.	Godwin, Parke
Dana, C. A.	Greeley, Horace

Hearst, W. R.
 Judd, Orange
 Labouchere, H. D.
 Lemon, Mark
 Medill, Joseph
 O'Connor, T. P.
 Pulitzer, Joseph

Reade, John
 Reid, Whitelaw
 Sangster, Margaret
 Stoddard, R. H.
 Stoddard, W. O.
 Watterson, Henry
 White, W. A.

5. CRITICISM, BIOGRAPHY AND MISCELLANEOUS

The function of the critic is to express judgment after detailed investigation, examination and review. The literary critic judges the faults and beauties of literary works. The biographer tells the story of the life of some person, including usually an estimate of his character and influence on the world. There are other prose writers whose works cannot be included under any headings thus far given. These are the Bible students, translators, philologists, grammarians, encyclopedia and dictionary compilers, library specialists, letter writers, humorists, satirists and writers on legal, political and miscellaneous subjects. See:

Ade, George
 Alford, Henry
 Allibone, S. A.
 Argyll, J. D. S. C.
 Aurelius, Marcus
 Baden-Powell, Sir G. S.
 Bates, Arlo
 Bigelow, Poultney
 Blackstone, Sir William
 Blouet, Paul (Max O'Rell)
 Boileau-Despréaux, Nicholas
 Boswell, James
 Brady, C. T.
 Brandes, G. M.
 Browne, C. F. (Artemus Ward)
 Bryce, James
 Butler, Samuel
 Caxton, William
 Chambers, Ephraim
 Channing, W. E.
 Chateaubriand, F. R. A.
 Chesterfield, Philip
 Chesterton, G. K.
 Child, Lydia M.
 Coffin, C. C.

Coverdale, Miles
 Cox, Palmer
 Croly, Jane C. (Jenny June)
 Curtis, W. E.
 Dana, R. H., Jr.
 Diderot, Denis
 Dobson, H. A.
 Dodge, Mary A. (Gail Hamilton)
 Donnelly, Ignatius
 Dowden, Edward
 Drummond, Henry
 Dryden, John
 Epictetus
 Erasmus, Desiderius
 Fitzgerald, Edward
 Forbes, Archibald
 Furness, H. H.
 Grotius, Hugo
 Hale, E. E.
 Haliburton, T. C. (Sam Slick)
 Hawthorne, Julian
 Hay, John
 Herder, J. G. van
 Hopkins, J. C.
 Hubbard, Elbert
 Kennan, George
 Landor, W. S.
 Le Gallienne, Richard
 Lessing, G. E.
 Lewes, G. H.
 Lighthall, W. D.
 Lockhart, J. G.
 Lucian
 Lysias
 Machiavelli
 Martineau, Harriet
 Martineau, James
 Matthews, Brander
 Max-Müller, Friedrich
 Mitchell, D. G. (Ik Marvel)
 Montesquieu
 Norton, C. E.
 Nye, E. W. (Bill Nye)
 Parton, James
 Paulding, J. K.
 Peck, H. T.
 Pepys, Samuel
 Pliny the Younger
 Plutarch
 Poole, W. F.
 Quintilian
 Rabelais, François
 Reade, John

Renan, Ernest
 Richter, J. P. F.
 Riis, J. A.
 Ripley, George
 Roberts, C. G. D.
 Rolfe, W. J.
 Roosevelt, Theodore
 Sainte-Beuve, C. A.
 Schlegel, A. W. von
 Schlegel, Friedrich von
 Seton, E. T.
 Shaw, H. W. (Josh Billings)
 Shillaber, B. P.
 Skeat, W. W.
 Smith, Goldwin
 Smith, Sydney
 Sparks, Jared
 Spofford, A. R.
 Stedman, E. C.
 Stephen, Sir Leslie
 Stoddard, R. H.
 Swift, Jonathan
 Taine, H. A.
 Tarbell, Ida M.
 Taylor, Bayard
 Underwood, F. H.
 Varro, M. T.
 Walton, Izaak
 Watson, John
 Watson, John (Ian Maclaren)
 Watson, T. E.
 White, R. G.
 Willis, N. P.
 Wilson, John (Christopher North)

IV. Noted Literary Characters, Works and References

See:

Æneid
 Aladdin
 Anglo-Saxon Chronicle
 Arabian Nights Entertainment, The
 Arthur, King
 Beatrice Portinari
 Beowulf
 Bible
 Don Quixote
 Edda
 Faust
 Galahad, Sir
 God Save the King
 Grail, The Holy

Hiawatha
Hood, Robin
Iliad
Indian Bible
Irish Plays
Kalevala
Koran
Lohengrin
Mandeville, The Travels of Sir John
Nibelungenlied
Parsifal
Puck
Rubaiyat
Saga
Tannhäuser
Tell, William
Utopia
Vedas
Zend-Avesta

V. Miscellaneous Topics

Bard	Passion Play
Bibliography	Poet Laureate
Brook Farm	Punch
Folk Lore	Romanticism
Hymn	Scald
Hymns, National	Spenserian Stanza
Kit-Kat Club	Theater
Lake School	Transcendentalism
Mastersinger	Troubadour
Minnesinger	Trouvère
Minstrel	

VI. Manuals of Literature

The best way to study Literature is to read the writers themselves, but the following manuals will be found helpful as guides:

Jusserand, *Literary History of the English People*; Moody and Lovett, *History of English Literature*; Taine, *English Literature*, translated by Van Laun; Saintsbury, *Elizabethan Literature*; Cross, *The Development of the English Novel*; Beers, *English Romanticism in the Eighteenth Century and English Romanticism in the Nineteenth Century*; Chamber's *Encyclopedia of English Literature*; Wendell and Greenough, *History of Literature in America*; Botta, *Handbook of Universal Literature*.

LAW AND POLITICAL SCIENCE

This department deals with the legal and governmental relations of men. The subject has attracted much interest in the past, but is even more important today when the spirit of democracy has become so widespread. No man can be a good citizen unless he is sufficiently well-informed concerning the laws and regulations of his government to exercise the rights of citizenship intelligently.

The subject of Law will be considered first, after which Civic and Politics will be discussed together.

LAW

Law has private, national and international aspects, according as it deals with relationships which concern the individual, the nation or the nations. That law which concerns the individual or nation is called municipal or national. This is divided into two classes, Substantive Law and Remedial Law.

For general article, see:

Law

I. Substantive Law

Substantive Law defines the normal relationships, rights and duties of citizens and of the government. See:

Bill of Rights
Blue Laws
Civil Laws
Civil Rights Act
Commercial Law
Common Law
Conservation
Copyright
Deed
Descent
Divorce
Eminent Domain
Entail
Equity
Estate
Executor
Fee
Flotsam and Jetsam
Good Will
Guardian

Habeas Corpus
 Heir
 Homestead
 Husband and Wife
 Income Tax (See Tax)
 Inheritance Tax (See Tax)
 Lease
 License
 Marriage
 Mortgage
 Parent and Child
 Patent
 Pension
 Personal Property
 Primogeniture
 Real Property
 Right of Way
 Riparian Rights
 Salic Law
 Statute
 Sumptuary Laws
 Tenant
 Title
 Torrens System
 Will

II. Remedial Law

Remedial Law deals with abnormal or wrong conditions, and with the means and agencies used for the correction of evils by the enforcement of legal rights, both public and private. See:

Affidavit
 Alias
 Appeal
 Assumpsit
 Attachment
 Attainder
 Bail
 Bertillon System
 Capias
 Capital Punishment
 Circuit Court
 Client
 Convict Labor
 Court
 Court of Claims
 Damages
 Debt
 Demurrer
 District Court
 Duress
 Easement

Ejectment
 Employer's Liability
 Eviction
 Evidence
 Ex Post Facto Law
 False Imprisonment
 Garnishment
 Guaranty
 Imprisonment
 Indictment
 Injunction
 Judgment
 Jury
 Lien
 Local Option
 Lynch Law
 Martial Law
 Northwest Mounted Police
 Ordeal, Trial by
 Pardon
 Parole
 Pillory
 Prescription
 Prison
 Probate Court
 Procedure
 Prohibition
 Quo Warranto
 Receiver
 Reprieve
 Subpœna
 Supreme Court
 Tort
 Warrant
 Witness
 Writ

III. Crimes and Misdemeanors

There are numerous legal terms having reference to crimes and misdemeanors. See:

Arson	Malice
Assault and Battery	Murder
Blackmail	Negligence
Conspiracy	Perjury
Contempt	Piracy
Embezzlement	Political Offenses
False Pretense	Robbery
Felony	Smuggling
Fraud	Treason
Larceny	Trespass
Libel	

IV. International Law

International Law deals with the legal relationships existing among nations. Before the law all nations are equal, each being an independent legal "person." International Law is founded upon the general consciousness of justice, long-established usage, common agreement and definite treaties. See:

International Law
Admiralty Laws
Aix-la-Chapelle, Treaties of
Alabama Claims
Alien
Arbitration, International
Balance of Power
Bering Sea Controversy
Chinese Exclusion Act
Clayton-Bulwer Treaty
Diplomacy
Embargo Act
Extradition
Fifty-four Forty or Fight
Fisheries Question
Gadsden Treaty
Ghent, Treaty of
Guadalupe Hidalgo, Treaty of
Hay-Pauncefote Treaty
High Seas
Immigration
Jay Treaty
Marque and Reprisal, Letters of
Milan Decree
Monroe Doctrine
Neutrality
Open-Door Policy
Pan-American Congress
Pan-American Union, Bureau of
Paris, Treaties of
Passport
Peace Conference, International
Prisoners of War
Reciprocity
San Ildefonso, Treaty of
Search, Right of
Treaty
Trent Affair
Utrecht, Treaty of
Washington, Treaty of
Webster-Ashburton Treaty

CIVICS AND POLITICS

To describe the subjects treated in this department, three terms are sometimes used, with slightly different shades of meaning. *Political Science* is the general term for the science dealing with the organization of political states. *Politics* is sometimes used in that sense also but generally includes the *art* of government as well; that is, the practical administration of governmental affairs. *Civics*, or *Civil Government*, is the department of Political Science that deals with the rights and duties of citizenship. The term *Civics* and *Politics* designate with sufficient accuracy the topics treated in the following outline.

For general articles, see:

Government
United States, subhead Government

I. General Topics

Under this heading will be found articles dealing with general governmental subjects. See:

Amendment
Australian Ballot
Bill of Rights
Cabinet
Caucus
Charter
Citizen
Civil Service
Colony
Commission Form of Government
Committee of the Whole
Constitution
Court
Duma
Electoral College
Flag
Freeman
Gerrymander
Graft
Impeachment
Imperialism
Initiative, Referendum and Recall
Jingoism
Mace
National Conventions
Nihilism
Pardon

Parliament
 Parliamentary Law
 Paternalism
 Political Parties in the United States
 Press, Freedom of the
 Primary
 Privy Council
 Quorum
 Registration
 Seal
 Secession
 Sergeant at Arms
 Sovereignty
 Speaker
 Spoils System
 Squatter Sovereignty
 State, Department of
 States' Rights
 Territory
 Veto
 Voting Machine
 Whig
 Woman Suffrage

II. Federal, or National, Government

There are certain subjects that refer particularly or exclusively to the national civic body. See:

Agriculture, Department of
 Census
 Circuit Court
 Comptroller of the Treasury
 Commerce, Department of
 Congress
 Constitution of the United States
 Court of Claims
 Dead Letter Office
 District Court
 District of Columbia
 Electoral College
 Electoral Commission
 Flag, United States
 Force Bills
 Interior, Department of the
 Justice, Department of
 Labor, Department of
 Lands, Public
 Loco-Focos
 Louisiana Purchase
 Naturalization
 Navy, Department of the
 Northwest Territory
 Parcel Post

Patent
 Postage Stamp
 Postal Savings Bank
 Post Office
 President
 Presidential Succession
 Secret Service
 Southwest Territory
 Speaker
 State, Department of
 Supreme Court
 Tenure of Office Act
 Thanksgiving Day
 Treasury Department
 United States, Great Seal of
 Vice-President
 War, Department of
 Western Reserve

III. State and Local Government

In most countries there are local aspects of government. The United States, particularly, was at the beginning a union of independent colonies, and has preserved a large amount of local government through the state and subordinate governmental units. See:

Articles on the respective states, sub-head Government
 Arbor Day
 Commission Form of Government
 Coroner
 Fire Department
 Health, Boards of
 Initiative, Referendum and Recall
 Justice of the Peace
 Legislature
 Local Option
 Memorial Day
 Municipal Government
 Municipal Ownership
 Notary Public
 Police
 Probate Court
 Selectmen
 Sheriff
 Tammany
 Town Meeting

IV. Historical Topics

There are certain subjects closely affecting government which are interesting

chiefly for their historical influence upon the development of conditions as they now exist. See:

Albany Conventions
 Alien and Sedition Laws
 Annapolis Convention
 Barnburners
 Bear, The
 Blood Money
 Brother Jonathan
 Bucktails
 Carpetbaggers
 Committees of Safety
 Compromise of 1850
 Confederate States of America
 Confederation, Articles of
 Congress, Continental
 Copperhead
 Cradle of Liberty
 Crédit Mobilier
 Crittenden Compromise
 Declaration of Independence
 Democratic Donkey
 Democratic Rooster
 Dixie
 Domesday Book
 Dred Scott Case
 Emancipation, Proclamation of
 Era of Good Feeling
 Federalist, The
 Fenians
 Fifty-four Forty or Fight
 Frankland, State of
 Freedmen's Bureau
 Fugitive Slave Law
 Half-Breeds
 Hampton Roads Conference
 Hard Cider Campaign
 Hartford Convention
 Home Rule
 Hunkers
 John Bull
 Kansas-Nebraska Bill
 Kentucky and Virginia Resolutions
 Kitchen Cabinet
 Lewis and Clark Expedition
 Louisiana Purchase
 Louisiana Purchase Exposition
 Magna Charta
 Mason and Dixon's Line
 Mecklenburg Declaration
 Missouri Compromise
 Mugwump

Nullification
 Ordinance of 1787
 Ostend Manifesto
 Patrons of Husbandry
 Reconstruction
 Salary Grab
 Sick Man of Europe
 Specie Payments, Resumption of
 Squatter Sovereignty
 Tory
 Uncle Sam
 Underground Railroad
 Whig
 Whiskey Ring
 Wilmot Proviso
 World's Columbian Exposition
 X Y Z Papers

BIOGRAPHIES AND BOOKS

I. Biographies

The following are some of the representative jurists and statesmen:

Bismarck-Schönhausen
 Cavour
 Fuller, M. W.
 Gladstone, W. E.
 Hamilton, Alexander
 Hay, John
 Ito, Hirobumi
 Jefferson, Thomas
 Marshall, John
 Peter the Great
 Richelieu, A. J.
 Story, Joseph
 Waite, M. A.
 Washington, George
 Webster, Daniel

II. Books

For further reading, the following books will be found helpful:

Ewell, *The Essentials of Law*; Foote, *How to Be a Lawyer*; Flanders, *Constitution of the United States*; Maine, *Ancient Law and Popular Government*; James and Sanford, *Government in the State and Nation*; Hinsdale, *The American Government*; Fiske, *Civil Government of the United States*; Andrews, *New Manual of the Constitution*; Wright, *Civil Government*; Foster, *Cyclopedia of Civil Government*.

MATHEMATICS AND ENGINEERING

I. Mathematics

In a general way, Mathematics may be described as the science which treats of number, quantity and form, especially by the use of symbols; it deals with the measurement, properties and relations of quantities. The science is divided into Pure Mathematics and Applied Mathematics. Some knowledge of the subject is absolutely essential to every man, and even Higher Mathematics is closely related to practical affairs.

For general article, see:

Mathematics

1. PURE MATHEMATICS

Pure Mathematics deals with the principles of the science, without regard to their concrete application. See:

Algebra	Degree
Arithmetic	Geometry
Axiom	Logarithm
Calculus	Trigonometry

2. APPLIED MATHEMATICS

In Applied Mathematics the principles of the science are applied to practical affairs. Arithmetic, and some of the other subjects listed above under Pure Mathematics, belong partly to the applied branch of the science also.

For other subjects, see:

Geodesy
Metric System
Physics
Weights and Measures

II. Engineering

Originally, Engineering was the art of managing engines. The term has now been extended to cover the science and art by which the mechanical properties of matter are made useful in machines and structures. Engineering, therefore, applies the principles of Mathematics to the subject matter of a number of other sciences. The more important kinds of Engineering are Struc-

tural, Civil, Mechanical, Mining, Electrical, Chemical, Municipal and Military. See:

Engineering
Aqueduct
Caisson
Chemistry
Compass
Compass, Magnetic
Eiffel Tower
Fire Escape
Jetty
Levee
Mechanics
Mining
Reservoir
Strength of Material
Surveying

See also Index, Departments of Army and Navy; Transportation and Communication; Physics, subhead Electricity and Magnetism; Mechanic Arts, subhead Tools and Machinery; Medicine and Hygiene, subhead Hygiene and Sanitation.

III. Books

For further study the following books may be consulted:

Smith, *The Teaching of Elementary Mathematics*; Russell, *The Principles of Mathematics*; Dedekind, *Essay on the Theory of Numbers*; Clifford, *The Common Sense of the Exact Sciences*; Ball, *A Short History of Mathematics*; Kennedy, *The Mechanics of Machinery*; Kerr, *Power and Power Transmission*; Thurston, *The Materials of Engineering*; Gustave, *The Elements of Mechanism*; Lanza, *Applied Mechanics*; Carpenter, *A Text-Book of Experimental Engineering*.

MECHANIC ARTS

I. Manufactures

In the modern economic system, next in importance to the production of raw materials comes the conversion of these materials by processes of manufacture into such products as will meet the manifold wants of life. Manufacturing, therefore, lies at the heart of industry.

The story of its development in the modern factory system is of unusual interest, and may well be read as an introduction to this study. For general article, see:

Factory

1. TOOLS AND MACHINERY

Tools and machinery are the means by which raw materials are converted into manufactured products. They themselves are of course also products of manufacture. See:

Bellows	Lathe
Bessemer Converter	Lightning Rod
Blast Furnace	Metronome
Boiler	Microscope
Boring Machines	Mirror
Broom	Nails
Camera Lucida	Needle
Camera Obscura	Open-Hearth
Cash Register	Furnace
Chronograph	Opera Glass
Clock	Pedometer
Cotton Gin	Planing Machine
Crane	Pneumatic Tools
Derrick	Pump
Die and Die	Reverberatory
Sinking	Furnace
Dredger	Rolling Mill
Dynamo	Safe
Dynamometer	Safety Lamp
Electric Motor	Safety Valve
Elevator	Saw
Eudiometer	Sewing Machine
File	Sextant
Filter	Shotgun
Fire Engine	Slot Machines
Fire Extinguisher	Solar Engine
Flour	Solar Microscope
Fluoroscope	Spectacles
Forge, Forging	Spectroscope
Furnace	Spinning
Gas Engine	Spirometer
Gauge	Steam Engine
Governor	Steam Hammer
Grain Drill	Steam Shovel
Hourglass	Steam Turbine
Hydraulic Ram	Steam Whistle
Hydrometer	Stereopticon
Hydrostatic Press	Stereoscope
Kaleidoscope	Stethoscope
Knitting Machine	Strassburg Clock

Stroboscope
Sundial
Theodolite
Thermometer
Transit
Treadmill
Trip Hammer
Vacuum Cleaner
Vacuum Pan

Valve
Voting Machine
Watch
Water Meter
Water Turbine
Water Wheel
Weighing Machines
Windlass
Windmill

2. RAW MATERIALS

Raw materials are the contribution of nature toward the manufactured product. Without these as the basis, industry, and life itself, would be impossible. See:

Ambergris	Mother-of-Pearl
Asbestos	Musk
Chalk	Natural Gas
Coal	Petroleum
Coir	Platinum
Copper	Pumice Stone
Cork	Rattan
Fur	Sand
Gamboge	Silk
Guano	Straw
Ivory	Teak
Kelp	Tortoise Shell
Lac	Whalebone

3. PROCESSES

The processes or methods of manufacture, by which raw materials are converted into the finished product, are varied and full of interest. See:

Annealing	Meat Packing
Assaying	Metallurgy
Blasting	Photography
Bleaching	Photo-Engraving
Candy	Photogravure
Canning	Rubber
Cold Storage	Sand Blast
Combustion	Spectrum Analysis
Dyeing	Spinning
Electroplating	Stereotype
Embalming	Tempering
Etching	Waterproofing
Flour	Weaving
Gold Beating	Welding
Ice	Well Boring
Japanning	Wool, Manufacture of
Leather	Zinc Etching
Lithography	

4. PRODUCTS

All of the tools, processes and labor of manufacture are for the sake of the finished product, that the needs of men may be satisfied and human life enriched. See:

Abrasives	Gutta-Percha
Acetylene	Half Tone
Alabaster	India Ink
Alcohol	Iron and Steel
Alum	Lampblack
Annatto	Lime
Artificial Limbs	Lime Light
Baking Powder	Linseed Oil
Barrel	Linoleum
Bell	Liquid Air
Binding Twine	Lumber
Boots and Shoes	Majolica
Bottle	Matches
Brass	Meerschchaum
Brick	Mineral Wool
Bronze	Morocco
Calico	Mosaic
Carborundum	Mucilage
Celluloid	Nitroglycerin
Cellulose	Paint
Cements	Palm Oil
Charcoal	Paper
Coal Tar	Paper Hangings
Coke	Papier-Mâché
Collodion	Paraffin
Cordage	Petroleum
Crayon	Plaster of Paris
Dutch Metal	Pottery
Dynamite	Resin
Emery	Rosewood
Felt	Rosin
Firecrackers	Sealing Wax
Fireworks	Shoddy
Flowers, Artificial	Silk, Artificial
Fuel	Slag
Fuse	Smokeless Powder
Galvanized Iron	Soda Water
Gas, Illuminating	Spermaceti
German Silver	Stearic Acid
Glass	Stearin
Glue	Stucco
Glycerin	Sulphureted
Greek Fire	Hydrogen
Gum Arabic	Tapestry
Guncotton	Tartaric Acid
Gunpowder	Terra Cotta

Thread
Tiles
Ultramarine
Varnish
Veneer

Water Glass
Wax
White Lead
Zinc White

II. Occupations

Men are the active agents in the manufacture of goods. Their occupations are bound up with the various enterprises treated in the body of this work. For special articles on occupations, see:

Bookkeeping	Engraving
Cooperage	Meat Packing
Dentistry	Palmistry
Diving	Taxidermy
Embroidery	

III. Books

For further reading and study the following books will be found helpful:

Cunningham, *Growth of English Industry*; Ashley, *Economic History*; Wright, *Industrial Evolution of the United States*; Wells, *Recent Economic Changes*; Unwin, *Industrial Organization in the Sixteenth and Seventeenth Centuries*; Shadwell, *Industrial Efficiency*; Taylor, *Factories and the Factory System*; Cooke-Taylor, *Introduction to the History of the Factory System*; Wright, "Report on the Factory System of the United States" for the *Tenth United States Census*; Spahr, *America's Working People*.

MEDICINE AND HYGIENE

The subject of health is one of great importance. Kindly motives and trained brains will fail to accomplish their best results unless sustained by strong forces of physical life.

"An ounce of prevention is worth a pound of cure" is the motto of modern physicians. Rational care of the health is constantly emphasized. This department is a broad one, therefore, including the preservation of health as well as its restoration. In a large sense, it includes recreations and physical culture, but for the sake of convenience these are treated separately under the Index title of Athletics and Pastimes.

I. General Articles

For general introduction articles, see:

Medicine	Osteopathy
Druggist	Pharmacy
Faith Cure	Rat
Fly	Sanitary Commission,
Homeopathy	United States
Hospital	Sanitary Science
Massage	Vegetarianism
Medical College	Wounds
Mosquito	

II. Anatomy and Physiology

For treatment of this division of the subject, see Index, Physiology and Anatomy.

III. Hygiene and Sanitation

Hygiene and Sanitation deal with the preservation of health. See:

Index, Domestic Science, subhead Foods	
Hygiene	Heating and
Sanitary Science	Ventilation
Acclimatization	Heredity
Bath	Ice
Circulation	Nervous System
Cold Storage	Quarantine
Digestion	Respiration
Disinfectant	Sewage
Filter	Sleep
Food	Soap
Garbage	Vacuum Cleaner
Health, Boards of	

IV. Pathology and Therapeutics

Pathology treats of disease, and Therapeutics deals with the treatment of diseases by the application of medicines. See:

Therapeutics

1. DISEASES

For information concerning the more common diseases, see:

Aphasia	Burns and Scalds
Apoplexy	Cancer
Appendicitis	Cataract
Asthma	Catarrh
Barber's Itch	Cholera
Bright's Disease	Cholera Infantum
Bronchitis	Croup

Delirium Tremens
Diphtheria
Dropsy
Drowning
Epilepsy
Erysipelas
Fatigue
Fever
Frostbite
Gangrene
Gastritis
Goiter
Gout
Hay Fever
Hernia
Hiccough
Hives
Hookworm
Hydrophobia
Hysteria
Infectious Diseases
Influenza
Insanity
Insomnia (See Sleep)
Intoxication
Itch
Jaundice
Lead Poisoning
Leprosy
Locomotor Ataxia
Lumbago
Malaria
Measles
Mumps
Neuralgia
Neurasthenia
Neuritis
Pain (See Touch)
Palpitation
Paralysis
Pellagra
Plague
Pleurisy (See Lungs)
Pneumonia
Ptomaine Poisoning
Ringworm
Scarlet Fever
Scrofula
Scurvy
Seasickness
Smallpox
Somnambulism
Sprain

Stammering	Typhus Fever
Sunstroke	Varicose Veins
Tapeworm	Vertigo
Tetanus	Vomiting
Trichina	Whooping Cough
Tuberculosis	Wool Sorter's Disease
Tumor	Yellow Fever
Typhoid Fever	

2. MEDICINES AND DRUGS

See Index, Department of Botany, subhead Medicinal Plants.

For the common drugs and medicines, see:

Drugs	Hydrogen Peroxide
Absinthe	Iodoform
Anæsthetic	Ipecac
Antitoxin	Laudanum
Arnica	Laughing Gas
Artemisia	Magnesia
Asafetida	Morphine
Balm of Gilead	Musk
Belladonna	Narcotic
Caffeine	Opium
Calomel	Poison (Subhead
Camphor	Antidote)
Castor Oil	Quinine
Cayenne Pepper	Salts, Smelling
Chloral	Sarsaparilla
Chloroform	Sedative
Coca	Seidlitz Powders
Cocaine	Serum Therapy
Cod-Liver Oil	Snuff
Colocynth	Stimulant
Curari	Stramonium
Epsom Salt	Strychnine
Ether	Sulphonal

V. Surgery

Surgery is the art or practice of healing by means of operating on the diseased part. It has made great progress in modern times. See:

Surgery	Trephining
Bandage	Vaccination
Lunar Caustic	Vivisection

VI. Books

For supplemental reading the following books will be found helpful:

Willoughby, *Hygiene for Students*;
Harrington, *Practical Hygiene*; Sedg-

wick, *Sanitary Science and the Public Health*; Billings, *Ventilation and Heating*; Richards and Woodman, *Air, Water and Food*.

MYTHOLOGY

The myths and legends that gather about the early periods of history are full of interest and charm. Some of them are very beautiful. They have played an important part in religion and in the teaching of maxims and theories of life.

It is not necessary to enumerate the large number of myths and mythical characters described in the work. Each will be found in its proper place, according to the alphabetical arrangement of topics. For the most important of them, see:

Mythology	Cassiopeia
Achates	Castor and Pollux
Achilles	Centaur
Actæon	Ceres
Æneas	Charon
Æolus	Chimæra
Æsculapius	Clio
Agamemnon	Clytie
Ajax	Cupid
Amazons	Cyclops
Ambrosia	Damon and Pythia
Ammon	Dervish
Andromache	Diana
Andromeda	Diana, Temple of
Antæus	Divination
Antigone	Dryads
Anubis	Dwarfs
Apis	Echo
Apollo	Elves
Apple of Discord	Etna
Areopagus	Fates
Argonauts	Fauns
Argus	Flora
Atlas	Fortuna
Augeas	Freya
Aurora	Frigga
Avernus	Furies
Bacchus	Galatea
Baucis and Philemon	Ganymede
Cadmus	Genii
Calliope	Giants
Calypso	Gnomes

Golden Fleece
 Gordian Knot
 Graces
 Hades
 Halcyone
 Harpies
 Hebe
 Hecate
 Hector
 Helen
 Hercules
 Hero
 Hesperides
 Hydra
 Hymen
 Hyperion
 Iphigenia
 Iris
 Janus
 Jason
 Juno
 Jupiter
 Labyrinth
 Laocoön
 Lares and Penates
 Lethe
 Lucifer
 Magi
 Mars
 Medea
 Medusa
 Menelaus
 Mercury
 Midas
 Minerva
 Minotaur
 Morpheus
 Muses

Naiads
 Neptune
 Nibelungenlied
 Nymphs
 Odin
 Olympus
 Orpheus
 Osiris
 Parnassus
 Pegasus
 Perseus
 Pluto
 Polyphemus
 Pomona
 Prometheus
 Psyche
 Romulus
 Saga
 Sappho
 Satyrs
 Seven Sleepers
 Sirens
 Sol
 Sphinx
 Styx
 Tantalus
 Theseus
 Thor
 Titans
 Trojan War
 Troy
 Ulysses
 Valkyries
 Venus
 Vesta
 Vulcan
 Walhalla

ORGANIZATIONS AND CLUBS

Organizations, societies and clubs for all sorts of purposes have become very popular in American life. In addition to the social function which they perform, they supplement governmental and religious agencies in many lines of civic and industrial betterment.

I. Fraternal, Patriotic and Social

Some of the fraternal organizations have various insurance features also. See:

Ancient Order of United Workmen
 Cincinnati, Society of the
 Colonial Dames of America
 Daughters of the American Revolution
 Eastern Star, Order of the
 Elks, Benevolent and Protective Order of
 Foresters, Ancient Order of
 Foresters, Independent Order of
 Foresters of America
 Free Masons
 Garter, Order of the
 Good Templars, Independent Order of
 Grand Army of the Republic
 Knights of Columbus
 Knights of Pythias
 Legion of Honor
 Maccabees, Knights of the
 Odd Fellows, Independent Order of
 Orangemen
 Phi Beta Kappa
 Sons of Liberty
 Sons of Veterans
 Templars, Knights
 United Confederate Veterans
 Woman's Relief Corps
 Women's Clubs
 Woodmen of America, Modern
 Woodmen of the World, The

II. Educational

Many societies and clubs are organized primarily for scientific and educational purposes and exert a strong influence on the spread of knowledge and culture. Institutions for the collection of works of art, natural objects and historical relics are called museums. See:

For further reading the following books will be of interest:

Tylor, *Primitive Culture*; Cox, *Tales from Greek Mythology*, *A Manual of Mythology*, and *Mythology of the Aryan Nations*; Grimm, *Teutonic Mythology*; Lang, *Custom and Myth*, and *Myth, Ritual and Religion*; Müller, *Contributions to the Science of Mythology*; Dowson, *A Classical Dictionary of Hindu Mythology*; Squire, *Mythology of the British Islands*.

INDEX

Agassiz Association
American Association for the Advancement of Science, The
Audubon Society, The
Boys and Girls Clubs
Boy Scouts of America
British Association for the Advancement of Science, The
British Museum
Camp Fire Girls
Chautauqua Movement
Coast and Geodetic Survey, United States
Geographic Societies
Mothers, The National Congress of
National Academy of Design
National Academy of Sciences
National Museum of the United States
Royal Society, The
Women's Clubs

III. Reforms

Reform organizations are very numerous in every city of any size. They may be political, civic or social, in point of attachment. See:

Civic Federation, National
Social Settlements
Temperance, Sons of
Whitecaps
Woman's Christian Temperance Union
Women's Clubs

IV. Relief and Charity

The various societies for the relief of suffering and need perform a most important function in society. See:

Charities
Mercy, Sisters of
Red Cross Society

V. Religious

For religious societies and clubs, see:
American Federation of Catholic Societies
Baptist Young People's Union
Brotherhood of St. Andrew
Christian Endeavor, The United Society of
Young Men's Christian Association
Young Women's Christian Association

VI. Commercial

The clubs and societies organized for profit or in connection with business have been very numerous. For a few of special importance, see:

East India Company
Guild
Hanseatic League
Hudson's Bay Company
Labor, American Federation of
Labor Organizations
West India Company, Dutch

PHILOSOPHY AND PSYCHOLOGY

Philosophy may be defined, in a general way, as the systematic attempt to explain the ultimate nature of the universe and to unify the different departments of knowledge in one consistent whole. Its task is therefore twofold: On the one hand, it deals with the presuppositions of all science; and, on the other hand, it systematizes the conclusions of the concrete sciences. Some of the branches of philosophy have now been elevated into independent sciences, notably in the case of Psychology.

I. Philosophy

In its investigations into the nature of reality, the problems of Philosophy group themselves into two classes: (1) the ultimate groundwork of the universe (*Ontology* or *Metaphysics*); and (2) the presuppositions of knowledge (*Epistemology*).

For general article, see:

Philosophy

1. THEORIES OF BEING AND KNOWLEDGE

There are two main theories concerning the nature of ultimate reality: Idealism, which finds this to consist in mind itself; and Materialism, which locates it in matter. Similarly, there are two theories of knowledge, the one holding that the source of knowledge is the mind itself; the other, that knowledge comes through sense perception from an outer world.

For the various forms of these theories of being and knowledge, see:

Metaphysics	Pessimism
Agnosticism	Positivism
A Priori and	Pragmatism
A Posteriori	Rationalism
Empiricism	Realism
Evolution	Science
Idealism	Skepticism
Materialism	Transcendentalism
Optimism	

2. LOGIC

Logic is the branch of Philosophy that deals with correct thinking and the laws of valid reasoning. See:

Logic

A Priori and A Posteriori

Deductive Method

Inductive Method

Syllogism

3. ETHICS, ÆSTHETICS AND RELIGION

Philosophy deals also with the value judgments of mankind; concerning conduct and the good (*Ethics*), the beautiful (*Æsthetics*), and God (*Religion*). For articles on these subjects, see:

Ethics	Religion
Æsthetics	Stoicism
Emotions	Theosophy
Epicureanism	Utilitarianism
God	Will
Hedonism	

4. HISTORY

The best approach to the problems of philosophy is through the historical development of the subject. See:

Philosophy, subhead History

A. Ancient Philosophy

Ancient Philosophy began with nature theories; passed over with Socrates into ethical problems and interests; developed in Plato into an elaborate idealistic system which outlined all the great philosophical issues; acquired with Aristotle more systematic treatment and keener scientific interests; and in the post-Aristotelian schools passed into ex-

position of earlier systems and the consideration of practical problems, until it lost itself in Scholasticism. For articles on ancient Philosophy, arranged in the order of historical development, see:

Thales	Cyrenaics
Pythagoras	Socrates
Empedocles	Plato
Democritus	Academy
Anaxagoras	Aristotle
Protagoras	Theophrastus
Sophists	Zeno
Antisthenes	Stoicism
Cynics	Epicurus
Diogenes	Epicureanism
Aristippus	Philo Judæus

B. Medieval Philosophy

The development of medieval Philosophy was determined by the new ideas introduced by Christianity. These, fusing with traditional Aristotelian Philosophy, produced Scholasticism, the characteristic philosophical product of the Middle Ages. See:

Abelard, Pierre
Anselm, Saint
Aquinas, St. Thomas
Augustine, Saint
Duns Scotus, John
Peter Lombard

C. Modern Philosophy

Modern Philosophy had its beginnings in the age of the Renaissance, and was marked by a new study of the realities of nature and of life. It began almost simultaneously in the Empiricism of Bacon and the Rationalism of Descartes, and passed on through the epoch-making work of Kant, into the great idealistic systems of more recent times. See Index, Department of Biography, subhead Educators. See:

Renaissance
Bacon, Francis
Bentham, Jeremy
Berkeley, George
Comte, I. A. M.
Descartes, René
Erasmus, Desiderius
Fichte, J. G.

Hamilton, Sir William
Hegel, G. W. F.
Herbart, J. F.
Herder, J. G. von
Hobbes, Thomas
Hume, David
Kant, Immanuel
Leibnitz, G. W.
Locke, John
Lotze, R. H.
Mill, J. S.
Reid, Thomas
Rousseau, J. J.
Schelling, F. W. von
Schopenhauer, Arthur
Spencer, Herbert
Spinoza, Baruch
Voltaire

II. Psychology

The new science of Psychology (dating from the latter half of the 19th century), applies the scientific method to the study of the phenomena of consciousness and the human mind as rigorously as the natural sciences apply the method to the phenomena of nature.

For general articles, see:

Psychology
Phrenology

1. CONSCIOUSNESS

For articles bearing on the subject of consciousness, see:

Clairvoyance	Mind
Ghost	Sleep
Hypnotism	Somnambulism

2. SENSATION

Sensation provides the raw materials of thought. See:

Sensation	Smell
Ear	Taste
Eye	Touch
Fatigue	

3. INTELLECTUAL PROCESSES

From the materials furnished by the simple sensations, the higher mental conceptions are built up through the intellectual processes. See:

Apperception	Instinct
Attention	Interest
Concept	Judgment
Conception	Memory
Emotions	Perception
Ideas, Association of	Reason
Imagination	Thought
Impulse	Will

III. Books

In addition to the writings of the great philosophers, which should be studied at first hand, the following books will be found helpful:

Ladd, *Introduction to Philosophy*; Janet and Séailles, *A History of the Problems of Philosophy*; Watson, *An Outline of Philosophy*; Royce, *The World and the Individual*; Rogers, *A Student's History of Philosophy*; Windelband, *History of Philosophy*; Schwegler, *History of Philosophy*; Royce, *The Spirit of Modern Philosophy*; Bowne, *Principles of Ethics*; Ladd, *Philosophy of Conduct*; Dewey, *Outlines of Ethics*; Van Dyke, *Principles of Art*; Day, *Science of Aesthetics*; Bowne, *Philosophy of Theism*; Fairbairn, *Philosophy of Christian Religion*; James, *The Principles of Psychology*; Sully, *The Human Intellect*; Halleck, *Psychology and Psychic Culture*, and *Education of the Central Nervous System*.

PHYSICS

Physics, from the Greek word meaning nature, was originally that branch of science that dealt with the material world—natural philosophy. Gradually parts of the field have been occupied by other sciences, such as Biology, Chemistry, Astronomy and Geology, leaving Physics to deal mainly with the closely related subjects of Light, Sound, Heat, Electricity and Mechanics, involving phenomena that have no changes of chemical composition. Physics is sometimes defined as the science of matter and motion; sometimes, also, as the science of energy and its transformations.

For general article, see:

Physics

INDEX

I. General Topics

There are certain topics of a general nature in connection with the subject of Physics. See:

Adhesion	Laboratory
Capillarity	Matter
Cohesion	Molecule
Diffusion	Vacuum
Gas	

II. Electricity and Magnetism

So far as we know, Electricity and Magnetism are alike in nature. The subject is one of great interest, both scientifically and commercially. See:

Electricity
Magnetism
Cathode Rays
Coulomb
Coulomb's Law
Compass, Magnetic
Dynamo
Electric Battery
Electric Capacity
Electric Clock
Electric Current
Electric Discharge
Electric Generator
Electric Heating
Electricity, Use in the Arts
Electricity, Uses in the Home
Electric Lighting
Electric Machine
Electric Meter
Electric Motor
Electric Potential
Electric Quantity
Electric Railway
Electric Resistance
Electrochemistry
Electrode
Electrodynamometer
Electrokinetics
Electrolysis
Electromagnet
Electromagnetism
Electrometer
Electron
Electrophorus
Electroplating
Electroscope
Electrostatics

Farad
Galvanometer
Geissler Tubes
Ignis Fatuus
Induction Coil
Induction, Electromagnetic
Induction, Electrostatic
Induction, Magnetic
Leyden Jar
Lightning
Magnet
Magnetic Needle
Magneto
Motor Generator
Ohm
Ohm's Law
Radioactivity
Standard Cell
Storage Battery
Telegraph
Telegraph, Wireless
Telephone
Thermoelectricity
Transformer
Volt
Voltaic Pile
Watt
X Ray

III. Heat

Heat was formerly supposed to be a subtle fluid, but it is now known to be a form of energy. It is manifested to the senses as the effect of fire, the sun's rays or friction.

For articles concerning Heat, see:

Heat	
Boiling Point	Hygrometer
Bolometer	Joule's Law
Bunsen Burner	Mechanical Equivalent
Calorimetry	of Heat
Cold Wave	Osmosis
Dew	Pyrometer
Diffusion	Radiometer
Evaporation	Regelation
Frost	Thermodynamics
Fusion	Thermograph
Gases, Laws of	Thermometer

IV. Light

Light is that form of energy which enables the organs of vision to perform their function of sight. According to

accepted theories it is transmitted by the undulatory movement of the ether. See:

Light	Lime Light
Aberration	Microscope
Argand Lamp	Mirage
Camera Lucida	Mirror
Camera Obscura	Opera Glass
Camera,	Optics
Photographic	Phosphorescence
Color, Theory of	Photography
Diffraction	Photometer
Double Refraction	Polariscope
Fata Morgana	Polarization of Light
Field Glass	Rainbow
Flame	Spectroscope
Fluoroscope	Spectrum Analysis
Heliostat	Stereopticon
Lens	Telescope

V. Sound

Sound, in Physics, is the form of energy which, by means of vibratory waves of the air, causes the sensation of hearing through the stimulation of the auditory nerve. By the invention of various devices sounds may be greatly magnified or carried to a great distance. See:

Sound	Resonance
Doppler's Principle	Siren
Echo	Speaking Trumpet
Microphone	Telephone
Phonetics	Wave
Phonograph	Whispering Gallery

VI. Mechanics

Mechanics is the branch of Physics which treats of the action of forces on bodies. Many kinds of machines have been devised for applying the principles of Mechanics to the work of the world. For a description of machinery see heading Mechanic Arts in this Index. For articles on Mechanics, see:

Mechanics
Air Pump
Archimedes' Screw
Barometer
Blowpipe
Dynamics
Dynamometer
Elasticity

Energy
Energy, Conservation of
Expansion
Falling Bodies
Force
Foucault Pendulum
Friction
Gravitation
Gravity, Center of
Gravity, Specific
Gyroscope
Hydromechanics
Hydrometer
Hydrostatic Press
Inclined Plane
Kinematics
Lever
Machines, Simple
Malleability
Micrometer
Momentum
Monometer
Motion, Laws of
Pendulum
Pneumatics
Power
Pulley
Screw
Siphon
Surface Tension
Tenacity
Torque
Vapor
Wedge
Wheel and Axle

VII. Books

The literature of Physics in its various branches is very extensive. A few helpful works are here enumerated: Textbooks on the general subject of physics by Ames, Barker, Daniels; Whewell, *History of the Inductive Sciences*; Mendenhall, *A Century of Electricity*; Tyndall, *Sound*; Maxwell, *Theory of Heat*; Tyndall, *Heat as a Mode of Motion*; Preston, *Theory of Light*; Ayrton, *Practical Electricity*; Perkins, *Electricity and Magnetism*; Lodge, *Modern Views of Electricity*.

Among the periodicals are: *American Journal of Science*; *Nature*; *Science*;

Scientific American; Scientific American Supplement; Terrestrial Magnetism.

PHYSIOLOGY AND ANATOMY

A knowledge of the human body is of great importance both to health and to the study of Psychology. These subjects can best be studied in connection with the other sciences, especially Biology, for the human body is closely related to those of other animals.

Anatomy is the science which treats of the bodily structure of animals. The term is also sometimes used with reference to the structure of plants, but in this outline it will be confined to the former.

Physiology treats of the processes and activities of living organisms. It deals with the living functions of the bodily organs whose structure is described in Anatomy. The mental functions, however, are not included in Physiology, but are treated in the separate science of Psychology.

In the present outline it will be more practically helpful to discuss Anatomy and Physiology together.

For general articles, see:

Anatomy
Histology
Medicine and Hygiene (Index)
Philosophy and Psychology, subhead
Psychology (Index)
Physiology

I. Bones and Tissues

The bones form the framework of the body, and the tissues make up the muscles, tendons, ligaments and various organs of the body. See:

Bone	Nails
Cartilage	Skeleton
Diaphragm	Skin
Gland	Skull
Hair	Tendon
Joints	Thoracic Duct
Ligament	Tissue, Animal
Muscles	

II. Digestive System

The digestive system takes the food into the body, manufactures it into material for building up the tissues and delivers it to the circulatory system in the form of lymph. See:

Abdomen	Lymphatics
Alimentary Canal	Palate
Bile	Pancreas
Gall Bladder	Pharynx
Gastric Juice	Saliva
Intestines	Spleen
Kidneys	Stomach
Lacteals	Teeth
Liver	Tongue
Lymph	

III. Circulatory System

The circulatory system receives the sustaining lymph from the digestive system, carries it in the blood to the various tissues of the body and brings away the waste cells. See:

Circulation	Heart
Arteries	Pulse
Blood	Veins
Capillaries	

IV. Respiratory System

The respiratory system brings into the body the air which purifies the blood. See:

Respiration	Lungs
Bronchial Tubes	Trachea
Larynx	Voice

V. Special Senses

The special senses introduce to the nervous system the raw materials of knowledge. See:

Ear	Taste
Eye	Touch
Smell	

VI. Nervous System

The nervous system converts into knowledge the raw materials received from the special senses and controls all the processes of the body. See:

Nervous System	
Brain	Reflex Action
Cranial Nerves	Spinal Cord

VII. Books

For further study the following works may be consulted:

Martin, *The Human Body*; Huxley, *Anatomy of Vertebrates*, and *Anatomy of Invertebrates*; Foster, *Text-Book of Physiology*; Schäfer, *Text-Book of Physiology*.

RELIGION AND THEOLOGY

Definitions of Religion are many and not very satisfactory, because the phenomena are so complex and manifold. The definition must be broad enough to cover all forms of Religion, from the lowest to the highest. In general terms, Religion is the recognition of a supernatural or superhuman being or beings to whom we are related, together with the beliefs and activities growing out of this relationship.

The classification of religions is also difficult. In the following outline the subject of Comparative Religion is first treated, including the topics under each religion except Judaism and Christianity, which, because of their greater importance to American readers, are discussed under separate headings.

For general article, see:

Religion

I. Comparative Religion

The study of Comparative Religion is of modern origin, although its roots reach back to antiquity. It investigates the early religious customs of mankind, the common element in Religion and the religious systems that have emerged in history.

For general article, see:

Religion

1. RELIGIOUS TERMS AND CUSTOMS

For religious terms, customs and ceremonies, see:

Anthropology and Ethnology (Index)
Mythology (Index)
Ancestor Worship
Animal Worship

Baal
Catechism
Censer
Creed
Devil
Druids
Fakir
Fast
Festivals
God
Hades

Hell
Hymn
Idolatry
Incense
Miracle
Priest
Sacrifice
Spiritualism
Tithes
Transmigration
Trinity

2. HISTORICAL RELIGIONS

For accounts of the more important religions of history, see:

Brahmanism	Mohammedanism
Vedas	Hegira
Vishnu	Koran
Buddhism	Lamaism
Canaanites	Mohammed
Christianity	Parsees
Confucius	Zend-Avesta
Edda	Zoroastrianism
Hittites	Philistines
Jews	Semites
Judaism	Shintoism
	Taoism

For the religions of Greece and Rome and of Scandinavia, see:
Greece, subheads Religion and Oracles
Mythology (Index)

II. Judaism

Judaism is the religious system of the Jewish people. It dates back to remote antiquity, and is the direct historical forerunner of Christianity. For this reason Judaism and Christianity have many ideas in common. See:

Judaism	High Priest
Jews	Hittites
Apocrypha	Israel, Kingdom of
Ark of the	Judah, Kingdom of
Covenant	Manna
Bible	Messiah
Canaanites	Nazarite
Cities of Refuge	Passover
Devil	Pentecost
Eden, Garden of	Pharisees
Fast	Philistines
Festivals	Priest
God	Sabbath

Sacrifice	Tabernacle	Galilee, Sea of	Olives, Mount of
Sadducees	Tabernacles, Feast of	Gath	Palestine
Samaritans	Talmud, The	Hebron	Resurrection
Sanhedrin	Temple, The	Hell	Sabbath
Septuagint	Tithes	Jericho	Samaria
Synagogue	Zionist Movement	Jerusalem	Sinai
See also heading	Christianity, subhead	Jordan	Sodom
Foundations below	in this outline.	Miracle	Tabor, Mount
		Moab	Tyre

III. Christianity

Christianity is the religion which was founded by Jesus of Nazareth in Palestine. It was first established among the Jewish people, and afterward in other parts of the world.

For general article, see:

Christianity

1. FOUNDATIONS

The study of Christianity should begin, not with present-day conceptions, but with the sources, and with the attempt to place one's self as fully as possible in the environment of its beginnings.

For general articles, see:

Christianity
Jesus Christ
God

A. Bible Books

The Bible, and especially the New Testament, is the primary source of information concerning the beginnings of Christianity.

Descriptions of the books of the Bible and of Bible characters will be found in their respective alphabetical positions. A list of them in the Index is not necessary.

C. Bible Places, Incidents and Customs

For places, incidents and customs of the Bible, see:

Apocalyptic Number	Cross
Babel, Tower of	Damascus
Baptism	Dead Sea
Bethany	Eden, Garden of
Bethlehem	Edom
Cæsarea Philippi	Esdraelon
Calvary	Festivals
Canaan	Galilee

2. HISTORY OF CHRISTIANITY

After the study of the Christian foundations we turn naturally to a consideration of how Christianity developed in the course of history.

A. Ancient and Medieval

The first three centuries following the founding of Christianity were the formative period in theology, Church organization and Christian customs. The medieval period was traditional rather than creative. See:

Anselm, Saint	Iconoclasts
Apostles' Creed	Lollards
Apostolic Succession	Monasticism
Arius	Nestorians
Athanasius, Saint	Nicene Creed
Augustine, Saint	Origen
Baptism	Polycarp
Catechism	Roman Catholic Church
Chalice	Tertullian
Christmas	Trinity
Codex	Waldenses
Creed	
Greek Church	

B. Roman Catholic Church

The old Catholic Church of the first few centuries was early transformed into the Roman Catholic Church, under the primacy of the pontiff at Rome. The latter then became the main channel of Christianity until the close of the medieval period, and has continued as one of the great influential branches of Christendom until the present day. See: Roman Catholic Church
Abbot
Agnus Dei
Angelus

Antony, Saint
 Apostles' Creed
 Apostolic Succession
 Augustine, Saint
 Basil the Great, Saint
 Becket, Thomas
 Benedictines
 Boniface
 Candlemas Day
 Catholic University of America
 Christmas
 Chrysostom, John, Saint
 College, The Sacred
 Corpus Christi, Feast of
 Dominicans
 Epiphany, Feast of the
 Farley, J. M.
 Feehan, P. A.
 Franciscans
 George, Saint
 Gibbons, James
 Good Friday
 Gregory VII
 Inquisition
 Ireland, John
 Jerome, Saint
 Jesuits
 Keane, J. J.
 Knights of Columbus
 Lateran, Church of St. John
 Lazarists
 Lent
 Leo
 Leo XIII
 Loyola, Saint Ignatius of
 McCloskey, John
 Manning, H. E.
 Mary, The Virgin
 Merry del Val, Raphael
 Monasticism
 Newman, J. H.
 Nicholas, Saint
 Palm Sunday
 Papal States
 Patrick, Saint
 Paulists
 Pentecost
 Peter the Hermit
 Pius X
 Pope
 Purgatory
 Quigley, J. E.
 Riorden, P. W.

Rosary
 Ryan, P. J.
 Sacrament
 Saint Louis University
 Seton, E. A.
 Spalding, J. L.
 Theology
 Thomas à Kempis
 Valentine, Saint
 Vatican
 Vatican Council
 Vespers
 Vestments, Ecclesiastical and Sacred
 Vulgate
 Wolsey, Thomas
 Xavier, Francisco de

C. Protestantism

While from the earliest times there were dissenting companies of Christians who belonged to neither the Roman Catholic nor the Greek Catholic Church, Protestantism as an influential movement dates from the Protestant Reformation of the 16th century. See:

Protestantism
 Reformation, The
 Adventists
 African Methodist Episcopal Church
 Anglican Communion
 Articles, The Thirty-nine
 Baptists
 Baptist Young People's Union
 Calvin, John
 Carey, William
 Christian Endeavor, The United Society of
 Christian Scientists
 Congregationalists
 Elizabeth
 England, Church of
 Episcopalians
 Epworth League
 Evangelical Alliance
 Evangelical Association
 Friends
 German Baptist Brethren
 Henry VIII
 Huss, John
 Hymn
 Knox, John
 Luther, Martin

Lutherans
 Melancthon, Philipp
 Mennonites
 Methodists
 Missions and Missionaries
 Moravians
 Mormons
 Presbyterians
 Raikes, Robert
 Reformed Episcopal Church
 Salvation Army
 Shakers
 Sunday Schools
 Swedenborgians
 Unitarians
 Universalists
 Volunteers of America
 Wesley, John
 Wiclif, John
 Young Men's Christian Association
 Young Women's Christian Association
 Zwingli, Ulrich

IV. Books

For further reading and study the following works may be consulted with profit:

Brinton, *The Religious Sentiment*; Caird, *Evolution of Religion*; Menzies, *History of Religion*; Tylor, *Primitive Culture*; Tiele, *Outlines of the History of Religion*, and *Elements of the Science of Religion*; Fisher, *The Grounds of Theistic and Christian Belief*; Harnack, *What is Christianity?* Bruce, *Apologetics*; Clarke, *An Outline of Christian Theology*; Driver, *Introduction to the Literature of the Old Testament*; Westcott, *General Survey of the History of the Canon of the New Testament*; Farrar, *The Messages of the Books*; Moulton, *The Literary Study of the Bible*; Nash, *History of the Higher Criticism of the New Testament*; McClymont, *The New Testament and Its Writers*; Hastings, *Bible Dictionary*; Fisher, *History of the Christian Church*, *History of the Reformation*; Newman, *Manual of Church History*; Walker, *The Reformation*; Stone, *Reformation and Renaissance*.

The following works are by Roman Catholic authors:

Shahan, *The Beginnings of Christianity*; Meagher, *Christ's Kingdom on Earth*; Cardinal James Gibbons, *The Faith of Our Fathers*.

TRANSPORTATION AND COMMUNICATION

Few things reveal the advance of social organization, both as cause and effect, more clearly than do the agencies of transportation and communication. From earliest times, when men walked and carried goods on their backs and had no means of communication save oral speech, up to the present complex age of railroads and telegraph lines, the paths of progress have been marked by increasing range and efficiency in these social organs. Indeed, they make our modern world possible. It may be true that kinship of feeling makes the whole world one, but transportation and communication are the material means which have given expression to this community of interest and transformed a world of isolated groups into one vast theater of action, where what is done in one part is of vital importance to every other part.

I. Transportation

Transportation includes those agencies by means of which men and goods are conveyed from one place to another. A wide range of travel, knowledge and commerce is possible only to a people with highly developed means of transportation.

For general article, see:

Travel and Transportation

1. METHODS AND VEHICLES

For the various methods and means of transportation, see:

Aeronautics	Buggy
Ambulance	Canal
Automobile	Canoe
Balloon	Chaise
Bicycle	Chariot

INDEX

Coach	Omnibus
Electric Railway	Parachute
Elevated Railway	Railroad
Ferry	Road
Gondola	Ship
Houseboat	Sleigh
Jinrikisha	Steamship
Junk	Street Railway
Monorail	Tunnel
Motor Cycle	Yacht
Navigation	

2. MACHINERY AND DEVICES

For machinery and devices used in transportation, see:

Air Brake	Locomotive
Anchor	Locomotive, Electric
Block Signals	Sail
Bridge	Screw Propeller
Capstan	Snowplow
Dynamo	Snowshoe
Electric Motor	Steam Engine
Fog Signals	Steam Turbine
Grain Elevator	Traction Engine
Hot-Air Engine	

3. CANALS AND TUNNELS

For the more notable canals and tunnels, see:

Canal
Tunnel
Atlantic Coast Canal
Caledonian Canal
Cape Cod Canal
Cenis, Mont, Tunnel of
Chesapeake and Ohio Canal
Chicago Drainage Canal
Corinth Canal
Delaware and Hudson Canal
Erie Canal
Illinois and Michigan Canal
Illinois and Mississippi Canal
Kiel Canal
Manchester Canal
Panama Canal
Saint Gotthard Tunnel
Sault Ste. Marie Canals
Simplon
Suez Canal
Welland Canal

4. RELATED TOPICS

For other topics related to the subject of transportation, see:

Breakwater
Buoy
Chart
Common Carrier
Compass, Magnetic
Cyclometer
Dock
Eddystone Lighthouse
Electricity
Express
Garage
Grain Elevator
Harbor
Jetty
Levee
Life Preserver
Life-Saving Service
Lighthouse
Log
Log Book
Merchant Marine
National Road
Pneumatic Tire
Road
Sounding
Steam

II. Communication

Communication includes all methods by means of which men exchange ideas and make their mutual wants and purposes known. There is no more interesting story in history than that of the invention of these devices which have bound the modern world together as one human family

1. METHODS AND MEANS

For methods and agencies of communication, see:

Alphabet
Block Signals
Book
Cable, Submarine
Fire Alarm
Fog Signals
Hieroglyphics
Language
Lighthouse

Moving Pictures
 Newspaper
 Pen
 Pencil
 Phonograph
 Pneumatic Dispatch
 Post Office
 Post Office Department
 Printing
 Printing Press
 Rocket
 Semaphore
 Shorthand
 Signaling
 Speaking Trumpet
 Steam Whistle
 Stencil
 Stereopticon
 Telegraph
 Telegraph, Wireless
 Telephone
 Type
 Typesetting Machine
 Typewriter
 Writing

2. RELATED TOPICS

For other topics related to communication, see:

Associated Press
 Bookbinding
 Copying Devices
 Dead Letter Office
 Franking
 Postage Stamp
 Proof

III. Books

For further reading and study about transportation and communication, the following works will be found helpful: Rocheleau, *Great American Industries—Transportation*; Hulbert, *Historic Highways of America*; Hadley, *Railroad Transportation*; Fry, *History of North Atlantic Steam Navigation*; Johnson, *Ocean and Inland Transportation*; *Interstate Commerce Commission Reports* (annual); *Reports of the Commissioner of Navigation* (annual); Loring, *A Handbook of the Electro-Magnetic Telegraph*; Mayer, *American Telegraphy: Systems, Apparatus, Operation*; Reid,

History of the American Telegraph; Bright, *Submarine Telegraphy*; Lodge, *Signaling Through Space Without Wires*; Abbot, *Telephony*; Miller, *Telephone Principles and Practice*; Webb, *Telephone Handbook*.

ZOOLOGY

Zoology, treating of animal life, and Botany, treating of plant life, are the two great divisions of Biology, the science of life. But these two branches are so large and so distinct in most of their features that for practical purposes it is best to outline them separately. See Index, Department of Botany.

It is much easier to keep in mind facts that are learned about members of the animal kingdom if these facts are logically arranged. Systematic Zoology concerns itself with the grouping of the animals according to their structure, and necessarily makes use of scientific terms. A familiarity with these terms makes zoological study more connected. Descriptive Zoology deals with facts observed about the various animals, their habits, homes and relation to man. In the following outline the main groups of zoological classification are given in their order under Systematic Zoology; under the heading Descriptive Zoology are given the names of the most of the animals, each placed in the group to which it belongs.

For general articles and related topics, see:

Aviary	Fossils
Biology	Gaff
Caviar	Hibernation
Cell	Migration
Eggs	Mimicry
Evolution	Nests of Birds
Feathers	Net
Fish Commission,	Protoplasm
United States	Shell
Fisheries	Spawn
Fisheries Question	Zoological Garden
Fish Hatchery	

I. Systematic Zoology

Systematic Zoology classifies the data derived from the study of the animal world. This classification, which cannot here be given in detail, since that would mean the writing of a manual on Zoology, is discussed in the general article Zoology, subhead Classification. The terms given below are fully explained under their respective titles, and a fair knowledge of zoological classification may be obtained by reading these articles in the order given. See:

Protozoa	Batrachia
Rhizopoda	Reptilia
Infusoria	Lizard
Sponge	Serpent
Cœlenterata	Tortoise
Worm	Crocodile
Mollusca	Birds
Cephalopoda	Mammalia
Arthropoda	Duckbill
Insecta	Echidna
Orthoptera	Marsupialia
Hemiptera	Edentata
Neuroptera	Rodentia
Coleoptera	Cetacea
Lepidoptera	Sirenia
Diptera	Ungulata
Hymenoptera	Pinnipedia
Crustacea	Carnivora
Arachnida	Insectivora
Echinodermata	Bat
Vertebrata	Primates
Fish	

II. Descriptive Zoology, or Natural History

The study of facts is the highway to knowledge. The discovery of this truth marks the great advance made by modern science. The observation and study of the facts of animal life are the task of Descriptive Zoology.

The following outline begins with the lowest order of life and proceeds to the highest.

1. PROTOZOANS AND LOWER METAZOANS

The lower orders consist of a single cell or of a simple combination of nearly

homogeneous cells. They are distinguished by their simple method of reproduction. See:

Amœba	Sea Anemone
Coral	Sea Cucumber
Globigerina	Sea Lemon
Hydra, Fresh-Water	Vorticella
Jellyfish	

2. MOLLUSKS (MOLLUSCA)

Mollusks are shellfish and are of comparatively low order. See:

Ammonite	Paper Nautilus
Chambered Nautilus	Scallop
Clam	Sea Hare
Conch	Slug
Cuttlefish	Snail
Limpet	Squid
Mussel	Teredo
Octopus	Whelk
Oyster	

3. APPENDICULATES

See:

Earthworm
Arthropoda

Arthropods have segmented bodies and jointed limbs. The class includes Insects, Crustaceans and Arachnids.

A. Insect (Insecta)

The group Insecta is divided into 19 orders. The seven most important of these are: Grasshoppers, bugs, ant lions, beetles, moths and butterflies, flies and bees.

(a) Grasshoppers (Orthoptera)

See:

Cockroach	Locust
Cricket	Mantis
Grasshopper	Mole Cricket
Katydid	Walkingstick
Leaf Insect	

(b) Bugs (Hemiptera)

See:

Aphid	Lantern Fly
Bedbug	Louse
Bug	Mealy Bug
Chinch Bug	San José Scale
Cicada	Scale Insect
Cochineal	Squash Bug
Electric-Light Bug	Water Strider

(c) Beetles (Coleoptera)

See:

Bookworm	Hercules Beetle
Burying Beetle	June Bug
Carpet Beetle	Ladybug
Click Beetle	Potato Beetle
Cockchafer	Scarabæus
Cotton-Boll Weevil	Searcher Beetle
Curculio	Stag Beetle
Deathwatch	Tumblebug
Firefly	Weevil
Glow Worm	

(d) Butterflies and Moths (Lepidoptera)

See:

Butterfly	Codling Moth
Moth	Cutworm
Army Worm	Death's-Head Moth
Brown-Tail Moth	Gypsy Moth
Cabbage Worm	Hawk Moth
Cankermoth	Measuring Worm
Caterpillar	Tussock Moth
Clothes Moth	Webworm

(e) Flies (Diptera)

See:

Botfly	Hessian Fly
Crane Fly	Midge
Fly	Mosquito
Gadfly	Tsetse
Gnat	

(f) Bees (Hymenoptera)

See:

Ant	Ichneumon Fly
Bee	Mason Bee
Carpenter Bee	Sawfly
Hornet	Wasp

(g) Ant Lions, Dragon Flies and All Other Orders

See

Ant Lion	Jigger
Caddice Fly	May Fly
Dragon Fly	Termite
Earwig	Tobacco Worm
Flea	

B. Crustaceans (Crustacea)

See:

Barnacle	Land Crab
Crab	Lobster
Crayfish	Shrimp

C. Arachnids (Arachnida)

See:

Cattle Tick	Spider
Daddy Longlegs	Tarantula
Horshoe Crab	Tick
Mite	Trapdoor Spider
Scorpion	

4. ECHINODERMATA

See:

Starfish	Sea Urchin
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5. VERTEBRATES (VERTEBRATA)

Vertebrates are the higher forms of animal life, possessing a backbone and more complex bodily structure, including more highly developed nervous, digestive and reproductive systems.

A. Fishes (Pisces)

Fishes are cold-blooded, aquatic animals that breathe by means of gills rather than lungs. See:

Anchovy	Menhaden
Bass	Mullet
Bluefish	Perch
Bullhead	Pickrel
Burbot	Pike
Candlefish	Salmon
Carp	Sardine
Catfish	Sawfish
Cod	Sculpin
Dace	Sea Bass
Devilfish	Shad
Dogfish	Shark
Eel	Smelt
Electrical Fish	Sole
Fish	Stickleback
Flounder	Sturgeon
Flying Fish	Sucker
Goldfish	Sunfish
Grayling	Swordfish
Haddock	Tarpon
Hake	Trout
Halibut	Tuna
Herring	Turbot
Mackerel	Whitefish

B. Batrachians (Batrachia)

Batrachians are cold-blooded animals which have three distinct stages of

INDEX

development, the egg, the tadpole and the adult. See:

Bullfrog	Salamander
Frog	Toad
Mud Puppy	Tree Toad
Newt	

C. Reptiles (Reptilia)

Reptiles are cold-blooded animals, having scales made from the horny layer of the skin; and in general they have short limbs or only rudiments of limbs.

(a) Lizards

See:

Lizard	Glass Snake
Basilisk	Horned Toad
Chameleon	Iguana
Gecko	Skink
Gila Monster	

(b) Serpents

See:

Adder	Milk Snake
Anaconda	Moccasin Snake
Black Snake	Python
Boa Constrictor	Rattlesnake
Cobra	Viper
Copperhead	Water Snake
Garter Snake	

(c) Tortoises

See:

Tortoise	Turtle
Terrapin	

(d) Crocodiles

See:

Crocodile	Gavial
Alligator	

D. Birds (Aves)

Birds are feathered Vertebrates whose forelimbs are developed into wings. The birds listed in the Index are representative of their respective families or are of economic value. A large number of others are described in their respective alphabetical positions. See:

Adjutant Bird	Bluebird
Albatross	Bobolink
Auk	Bobwhite
Avocet	Bower Bird
Birds of Paradise	Brant Goose
Bittern	Brown Thrasher
Blackbird	Bullfinch

Bunting	Killdeer
Butcher Bird	Kingbird
Buzzard	Kingfisher
Canada Goose	Kite
Canary	Lapwing
Canvasback	Lark
Cardinal	Lark Bunting
Carolina Paroquet	Laughing Jackass
Carrier Pigeon	Linnet
Catbird	Loon
Chickadee	Lyre Bird
Cockatoo	Macaw
Cock of the Rock	Magpie
Condor	Mallard
Cormorant	Mandarin Duck
Cowbird	Marsh Hawk
Crane	Martin
Creeper Family	Meadow Lark
Crossbill	Mocking Bird
Crow	Mourning Dove
Cuckoo Family	Nighthawk
Curlew	Nightingale
Dickcissel	Nutcracker
Diver	Nuthatch Family
Dove	Oriole
Duck	Osprey
Eagle	Ostrich
Egret	Ovenbird
Eider Duck	Owl
Emu	Parrakeet
Falcon Family	Parrot
Finch	Partridge
Flamingo	Passenger Pigeon
Flicker	Peacock
Frigate Bird	Pelican Family
Goatsucker	Penguin
Goshawk	Petrel
Grackle	Pewee
Grebe	Phalarope Family
Grosbeak	Pheasant
Guinea Fowl	Phoebe
Gull	Pigeon
Harlequin Duck	Plover
Harpy Eagle	Ptarmigan
Hawk	Puffin
Heron	Rail Family
Hoopoe	Raven
Hornbill Family	Redstart
Humming Bird	Road Runner
Ibis	Robin
Jackdaw	Robin Redbreast
Jay	Rook
Junco	Ruffed Grouse

Sage Grouse	Thrush
Sandpiper Family	Titmouse Family
Sapsucker	Toucan Family
Secretary Bird	Tropic Bird
Skylark	Turkey
Snipe	Umbrella Bird
Sparrow	Vireo Family
Sparrow Hawk	Vulture
Spoonbill	Wagtail Family
Starling	Warbler
Stork	Waxwing Family
Swallow Family	Weaver Bird
Swan	Whippoorwill
Swift	Woodcock
Tailor Bird	Wood Duck
Tanager Family	Woodpecker Family
Teal	Wren Family
Tern	Wryneck

E. Mammals (Mammalia)

Mammals are the highest and most numerous Vertebrates, and are characterized by the fact that they suckle their young. Only the more important Mammals are listed in the Index. Many others will be found in their respective alphabetical positions.

(a) Duckbills (Monotremata)

See:

Duckbill	Echidna
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(b) Pouched Animals (Marsupialia)

See:

Bandicoot	Tasmanian Wolf
Kangaroo	Wombat
Opossum	

(c) Anteaters (Fodientia and Edentata)

See:

Anteater	Pangolin
Armadillo	Sloth

(d) Rodents (Rodentia)

See:

Beaver	Jumping Mouse
Chinchilla	Marmot
Gopher	Mouse
Ground Squirrel	Muskrat
Hare	Porcupine

Prairie Dog	Squirrel
Rabbit	Woodchuck
Rat	
See:	(e) Whales (Cetacea)
Dolphin	Porpoise
Grampus	Whale
Narwhal	

(f) Sea Cows (Sirenia)

See:

Dugong	Manatee
(g) Hoofed Animals (Ungulata)	

See:

Alpaca
Antelope
Ass
Bison
Boar
Buffalo
Camel
Cashmere Goat
Cattle
Chamois
Deer
Elephant (Proboscidea)
Elk
Gazelle
Giraffe
Gnu
Goat
Hippopotamus
Hog
Horse
Llama
Moose
Okapi
Peccary
Reindeer
Rhinoceros
Rocky Mountain Goat
Sheep
Stag
Tapir
Wart Hog
Yak
Zebra
Zebu

(h) Seals (Pinnipedia)

See:

Elephant Seal	Seal
Fur Seal	Walrus

(i) Flesh-Eating Animals (Carnivora)

(l) Primates (Primata)

See:

Badger	Lynx
Bear	Marten
Cat	Mink
Coyote	Ocelot
Dingo	Otter
Dog	Polecat
Ferret	Puma
Fox	Raccoon
Hound	Skunk
Hyena	Tiger
Ichneumon	Weasel
Jackal	Wildcat
Jaguar	Wolf
Leopard	Wolverine
Lion	

(j) Insect Eaters (Insectivora)

See:

Hedgehog	Shrew
Mole	Star-Nosed Mole

(k) Bats (Chiroptera)

See:

Bat	Vampire
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See:

Ape	Lemur
Baboon	Mandrill
Chimpanzee	Marmoset
Gibbon	Monkey
Gorilla	Orang-Utan
Howler	

III. Books

For further reading in the field of Zoology, see the following works:

Spencer, *Principles of Biology*; Osborn, *From the Greeks to Darwin*; Ingersoll, *The Life of Animals* (Mammals) and *Wild Neighbors*; Wright, *Four-Footed Americans* and *Birdcraft*; Reed, *Bird Guide*; Roosevelt, *African Game Trails*; Henshall, *Bass, Pike, Perch and Others*; volumes of the *American Sportsman's Library*; Kellogg, *Insects*; Hornaday, *Two Years in the Jungle*; Wood, *Homes Without Hands*; Seton, *Wild Animals I Have Known*; Burroughs, *Birds and Bees*; Thoreau, *Walden*.

